

Supporting information

Enantioselective Decarboxylative Mannich Reaction of β -Keto acids with *C*-Alkynyl *N*-Boc *N,O*-Acetals: Access to Chiral β -Keto Propargylamines

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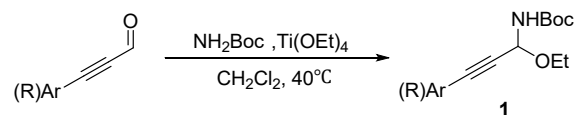
Contents:

General information.....	S2
General procedure for synthesis of <i>C</i> -alkynyl- <i>N</i> -Boc- <i>N,O</i> -acetals 1	S2
General procedure for synthesis of β -Keto acids 2	S2
General procedure for the reaction of <i>C</i> -alkynyl- <i>N</i> -Boc- <i>N,O</i> -acetals 1 with β -Keto acids 2	S3
Characterization data of the products 4 , 5	S3
General procedure for synthesis of 7	S21
Characterization data of the products 7	S21
Large-Scale catalytic asymmetric reactions.....	S22
Procedure for the synthesis and characterization data of compounds 8 , 9 , 10 , 11	S22
References.....	S25
Copies of NMR and HPLC.....	S26

General information

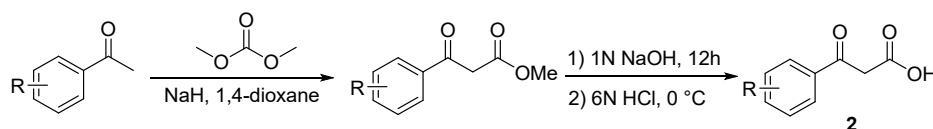
$^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and $^{19}\text{F-NMR}$ spectra were recorded on Bruker Avance 400 MHz spectrophotometer. Chemical shift (δ) are expressed in ppm, and J values are given in Hz. The enantiomeric excess was determined by HPLC using Chiralpak AD-H, Chiralpak IC-3 columns with *n*-Hexane and 2-propanol as eluents. High-resolution mass spectrometry (HRMS) was recorded on a VG Auto Spec-3000 spectrometer. Optical rotations were measured on a JASCO DIP-370p polarimeter at 589 nm at 20°C. Flash column chromatography was performed on silica gel (200-300 mesh, Qingdao Marine Chemical Inc.). Toluene, diethyl ether, and THF was distilled from sodium benzophenone ketyl immediately prior to use. MeCN, CHCl_3 , and CH_2Cl_2 were all distilled from CaH_2 immediately prior to use. Unless otherwise noted, all chemicals and solvents were purchased from Adama-beta®, Energy Chemical *et al.* and used as received without further purification. Chiral phosphoric acids were purchased from Daicel Chiral Technologies Co., LTD. *C*-alkynyl-*N*-Boc-*N,O*-acetals **1**, β -Keto acids **2** were prepared according to the reported procedures.

General procedure for synthesis of *C*-alkynyl-*N*-Boc-*N,O*-acetals **1**¹



To a solution of ynal (10 mmol) in dichloromethane (80 ml) under an argon atmosphere was added $\text{Ti}(\text{OEt})_4$ (4.26 g, 15 mmol) and BocNH_2 (1.76 g, 15 mmol) at room temperature. The reaction mixture was stirred under an argon atmosphere at 40°C for 12 h. The reaction was quenched by the addition of saturated Na_2SO_4 solution (20 mL). The resulting white precipitate was isolated, and the aqueous fraction was further extracted with CH_2Cl_2 (20 mL x 3). The combined organic fraction was dried over Na_2SO_4 and the solvent was evaporated to give a residue. The residue was purified by flash column chromatography using AcOEt /hexane as an eluent to afford *C*-alkynyl-*N*-Boc-*N,O*-acetal **1**.

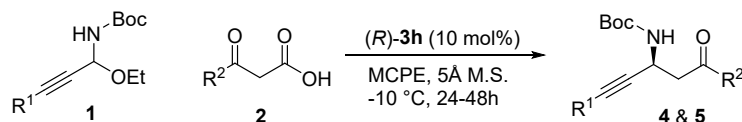
General procedure for synthesis of β -Keto acids **2**²



To a solution of the corresponding acetophenone (30 mmol) in 1,4-dioxane (30 ml) was

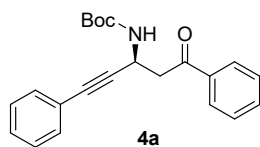
added sodium hydride (30 mmol, 720 mg) under nitrogen at room temperature and the resulting mixture was then stirred for 30 min. After the addition of dimethyl carbonate (36 mmol, 2.70 g) the mixture was heated at reflux until the acetophenone was totally consumed. The reaction was quenched with saturated sodium ammonium chloride and then extracted with diethyl ether. The combined organic layers were washed with brine, dried over anhydrous magnesium sulfate, and concentrated. To the crude methyl β -ketoacid ester was added 1N sodium hydroxide (50 mL) and the resulting mixture was stirred vigorously for 12 h. The reaction mixture was acidified by the addition of 6N HCl at 0 °C. After the precipitation of a white solid, dichloromethane was added to the resulting suspension. The layers were separated and the aqueous layer was extracted with dichloromethane. The combined organic layers were dried over anhydrous sodium sulfate and the solvent was removed under reduced pressure. The corresponding β -ketoacid **2** was recrystallized from hexanes/dichloromethane.

General procedure for the catalytic asymmetric decarboxylative Mannich reaction of *C*-alkynyl-*N*-Boc-*N,O*-acetals **1 with β -Keto acids **2****



To a solution of **1** (0.1 mmol) and **2** (0.12 mmol) in MCPE (1.0 mL) was added the catalyst **3h** (7.8 mg, 10 mol %) and 5Å MS (100 mg) at room temperature. After *C*-alkynyl-*N*-Boc-*N,O*-acetal **1** was consumed, the mixture was directly purified by silica gel chromatography (ethyl acetate/petroleum ether = 1/50 to 1/10) to afford the product **4** or **5** (the racemic product **4** or **5** was obtained by using 1,1'-binaphthyl-2,2'-diyl hydrogenphosphate as the catalyst).

Characterization data of the products **4, **5** and **7****



(*S*)-tert-butyl 5-oxo-1,5-diphenylpent-1-yn-3-ylcarbamate **4a**

White solid, 94% yield, 33.0 mg. $[\alpha]_D^{20} = -31.20$ (c 1.00 CHCl₃).

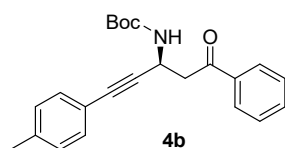
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.99-7.97 (m, 2H), 7.60-7.56 (m, 1H), 7.50 (t, 2H, *J* = 7.6

Hz, $J = 7.6$ Hz), 7.44-7.32 (m, 2H), 7.27-7.23 (m, 3H), 5.55 (br, 1H), 5.19-5.15(m, 1H), 3.61 (dd, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.36 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.09, 154.76, 136.79, 133.44, 131.76, 128.71, 128.28, 128.19, 128.15, 122.59, 87.79, 83.08, 80.06, 43.88, 40.08, 28.37.

HRMS calcd. for $\text{C}_{22}\text{H}_{23}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 372.1576, found: 372.1573.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 12.9$ min (minor), $t_{\text{R}} = 15.8$ min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-*p*-tolylpent-1-yn-3-ylcarbamate **4b**

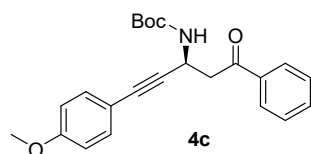
White solid, 88% yield, 32.0 mg. $[\alpha]_{\text{D}}^{20} = -30.30$ (c 1.50 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.98 (d, 2H, $J = 7.6$ Hz), 7.58 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.47 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.22 (d, 2H, $J = 8.0$ Hz), 7.05 (d, 2H, $J = 8.0$ Hz), 5.52 (br, 1H), 5.18-5.13 (m, 1H), 3.60 (dd, 1H, $J = 3.6$ Hz, $J = 3.6$ Hz), 3.35 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 2.30 (s, 3H), 1.45 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.12, 154.76, 138.36, 136.85, 133.38, 131.64, 128.90, 128.69, 128.20, 119.50, 87.04, 83.24, 80.01, 43.97, 40.18, 28.37, 21.41.

HRMS calcd. for $\text{C}_{23}\text{H}_{25}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 386.1732, found: 386.1730.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 10.1$ min (minor), $t_{\text{R}} = 17.8$ min (major).



(*S*)-tert-butyl 1-(4-methoxyphenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4c**

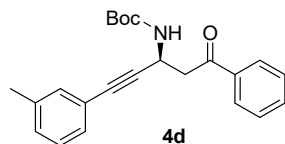
White solid, 85% yield, 32.0 mg. $[\alpha]_{\text{D}}^{20} = -40.30$ (c 1.33 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.98 (d, 2H, $J = 7.6$ Hz), 7.58 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.47 (t, 2H, $J = 8.0$ Hz, $J = 7.2$ Hz), 7.26 (d, 2H, $J = 8.8$ Hz), 6.77 (d, 2H, $J = 8.8$ Hz), 5.54 (br, 1H), 5.15 (t, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.77 (s, 3H), 3.60 (d, 1H, $J = 13.6$ Hz), 3.35 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.45 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.23, 159.57, 154.78, 136.79, 133.42, 133.20, 128.70, 128.20, 114.65, 113.77, 86.32, 82.99, 80.01, 55.25, 43.97, 40.06, 28.37.

HRMS calcd. for $\text{C}_{23}\text{H}_{25}\text{NO}_4\text{Na}$ $[\text{M}+\text{Na}]^+$: 402.1681, found: 402.1680.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, λ = 254 nm, retention time: t_{R} = 13.0 min (minor), t_{R} = 21.6 min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-*m*-tolylpent-1-yn-3-ylcarbamate **4d**

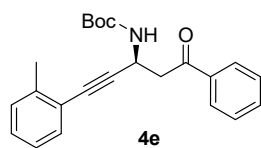
White solid, 83% yield, 30.0 mg. $[\alpha]_{\text{D}}^{20}$ = -304 (c 0.30 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.98 (d, 2H, J = 8.0 Hz), 7.58 (t, 1H, J = 7.2 Hz, J = 7.6 Hz), 7.48 (t, 2H, J = 7.6 Hz, J = 7.6 Hz), 7.15-7.11 (m, 3H), 7.08 (d, 1H, J = 4.4 Hz), 5.53 (br, 1H), 5.18-5.14 (m, 1H), 3.60 (dd, 1H, J = 3.2 Hz, J = 3.2 Hz), 3.35 (dd, 1H, J = 6.0 Hz, J = 6.0 Hz), 2.27 (s, 3H), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.08, 154.75, 137.81, 136.83, 133.40, 132.37, 129.16, 128.79, 128.70, 128.20, 128.04, 122.37, 87.40, 83.27, 80.02, 43.91, 40.08, 28.37, 21.13.

HRMS calcd. for $\text{C}_{23}\text{H}_{25}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 386.1732, found: 386.1728.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, λ = 254 nm, retention time: t_{R} = 8.6 min (minor), t_{R} = 10.0 min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-*o*-tolylpent-1-yn-3-ylcarbamate **4e**

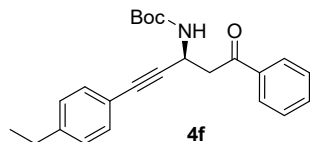
White solid, 92% yield, 33.0 mg. $[\alpha]_{\text{D}}^{20}$ = -276 (c 0.30 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.97 (d, 2H, J = 7.6 Hz), 7.58 (t, 1H, J = 7.2 Hz, J = 7.2 Hz), 7.48 (t, 2H, J = 7.6 Hz, J = 7.6 Hz), 7.29 (d, 1H, J = 7.6 Hz), 7.19-7.12 (m, 2H), 7.07 (t, 1H, J = 7.2 Hz, J = 7.2 Hz), 5.61 (br, 1H), 5.22-5.17 (m, 1H), 3.64 (d, 1H, J = 17.6 Hz), 3.37 (dd, 1H, J = 6.0 Hz, J = 6.0 Hz), 2.32 (s, 3H), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.20, 154.82, 140.44, 136.80, 133.46, 131.94, 129.32, 128.73, 128.30, 128.16, 125.38, 122.33, 91.72, 82.00, 80.44, 43.92, 40.28, 28.38, 20.57.

HRMS calcd. for C₂₃H₂₅NO₃Na [M+Na]⁺: 386.1732, found: 386.1732.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, λ = 254 nm, retention time: t_R = 8.6 min (minor), t_R = 11.3 min (major).



(*S*)-tert-butyl 1-(4-ethylphenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4f**

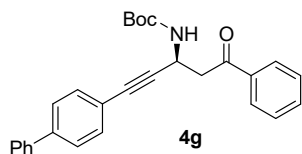
White solid, 96% yield, 36.0 mg. [α]_D²⁰ = -22.0 (c 0.50 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.97 (d, 2H, *J* = 7.6 Hz), 7.56 (t, 1H, *J* = 7.2 Hz, *J* = 7.6 Hz), 7.47 (t, 2H, *J* = 7.6 Hz, *J* = 7.6 Hz), 7.24 (d, 2H, *J* = 8.0 Hz), 7.07 (d, 2H, *J* = 7.6 Hz), 5.55 (br, 1H), 5.17-5.16 (m, 1H), 3.60 (d, 1H, *J* = 15.6 Hz), 3.34 (dd, 1H, *J* = 6.0 Hz, *J* = 6.0 Hz), 2.59 (q, 2H, *J* = 7.6 Hz, *J* = 7.6 Hz), 1.45 (s, 9H), 1.19 (t, 3H, *J* = 7.6 Hz, *J* = 7.6 Hz).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.14, 154.79, 144.69, 136.83, 133.40, 131.73, 128.69, 128.20, 127.72, 119.73, 87.05, 83.27, 80.01, 43.97, 40.17, 28.76, 28.38, 15.31.

HRMS calcd. for C₂₄H₂₇NO₃Na [M+Na]⁺: 400.1889, found: 400.1883.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, λ = 254 nm, retention time: t_R = 10.8 min (minor), t_R = 13.2 min (major).



(*S*)-tert-butyl 1-(biphenyl-4-yl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4g**

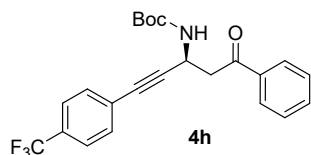
White solid, 87% yield, 37.0 mg. [α]_D²⁰ = -33.8 (c 0.44 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.98 (d, 2H, *J* = 7.6 Hz), 7.60-7.54 (m, 3H), 7.50-7.43 (m, 4H), 7.41-7.39 (m, 4H), 7.33 (t, 1H, *J* = 7.2 Hz, *J* = 7.2 Hz), 5.58 (br, 1H), 5.22-5.19 (m, 1H), 3.62 (dd, 1H, *J* = 3.2 Hz, *J* = 3.2 Hz), 3.37 (dd, 1H, *J* = 6.0 Hz, *J* = 6.0 Hz), 1.47 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.10, 154.79, 141.03, 140.32, 136.82, 133.45, 132.18, 128.83, 128.72, 128.22, 127.62, 127.00, 126.84, 121.51, 88.50, 82.99, 80.09, 43.92, 40.17, 28.40.

HRMS calcd. for C₂₈H₂₇NO₃Na [M+Na]⁺: 448.1889, found: 448.1884.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, λ = 254 nm, retention time: t_R = 11.0 min (minor), t_R = 16.7 min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-(4-(trifluoromethyl)phenyl)pent-1-yn-3-ylcarbamate **4h**

White solid, 82% yield, 34.5 mg. $[\alpha]_D^{20} = -20.3$ (c 0.33 CHCl₃).

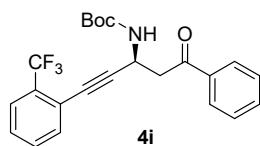
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.98 (d, 2H, $J = 7.2$ Hz), 7.60 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.52-7.47 (m, 4H), 7.43 (d, 2H, $J = 8.0$ Hz), 5.61 (br, 1H), 5.21-5.17 (m, 1H), 3.64 (dd, 1H, $J = 3.6$ Hz, $J = 3.6$ Hz), 3.39 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.97, 154.76, 136.60, 133.60, 132.00, 130.02 (d, $J = 32$ Hz), 128.76, 128.17, 126.44, 125.09 (d, $J = 4$ Hz), 122.52, 90.43, 81.68, 80.24, 43.57, 39.87, 28.35.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -62.85.

HRMS calcd. for C₂₃H₂₂F₃NO₃Na [M+Na]⁺: 440.1449, found: 440.1447.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.8$ min (minor), $t_R = 14.9$ min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-(2-(trifluoromethyl)phenyl)pent-1-yn-3-ylcarbamate **4i**

White solid, 81% yield, 34.0 mg. $[\alpha]_D^{20} = -23.7$ (c 0.25 CHCl₃).

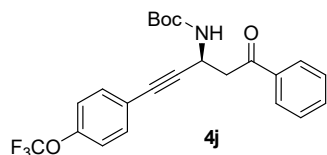
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.97 (d, 2H, $J = 7.2$ Hz), 7.60-7.57 (m, 2H), 7.52-7.42 (m, 4H), 7.36 (t, 1H, $J = 7.6$ Hz, $J = 7.6$ Hz), 5.62 (br, 1H), 5.20 (t, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.63 (dd, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.39 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.90, 154.81, 136.64, 133.97, 133.47, 131.84, 131.29, 128.70, 128.05 (d, $J = 7$ Hz), 125.7 (d, $J = 5$ Hz), 124.76, 122.04, 120.89, 93.71, 80.11, 78.96, 43.49, 39.91, 28.33.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -62.34.

HRMS calcd. for C₂₃H₂₂F₃NO₃Na [M+Na]⁺: 440.1449, found: 440.1449.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 8.6$ min (minor), $t_R = 9.5$ min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-(4-(trifluoromethoxy)phenyl)pent-1-yn-3-ylcarbamate **4j**

White solid, 80% yield, 35.0 mg. $[\alpha]_D^{20} = -18.4$ (c 0.32 CHCl₃).

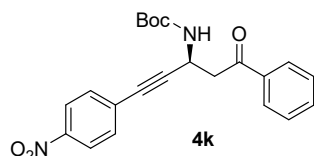
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.98 (d, 2H, $J = 7.6$ Hz), 7.59 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.35 (d, 2H, $J = 8.4$ Hz), 7.09 (d, 2H, $J = 8.2$ Hz), 5.58 (br, 1H), 5.17 (t, 1H, $J = 3.6$ Hz, $J = 4.0$ Hz), 3.62 (dd, 1H, $J = 3.2$ Hz, $J = 3.2$ Hz), 3.37 (dd, 1H, $J = 6.0$ Hz, $J = 5.6$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.96, 154.76, 136.64, 133.58, 131.99, 128.75, 128.16, 126.46, 125.22, 125.08 (d, $J = 4$ Hz), 122.52, 90.46, 81.69, 80.23, 43.59, 39.91, 28.35.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -62.87.

HRMS calcd. for C₂₃H₂₃F₃NO₄Na [M+Na]⁺: 456.1399, found: 456.1393.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 8.5$ min (minor), $t_R = 11.8$ min (major).



(*S*)-tert-butyl 1-(4-nitrophenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4k**

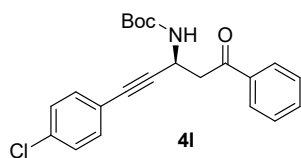
White solid, 78% yield, 31.0 mg. $[\alpha]_D^{20} = -57.6$ (c 1.10 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.12 (d, 2H, $J = 8.8$ Hz), 7.98 (d, 2H, $J = 8.0$ Hz), 7.61 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.49 (t, 4H, $J = 8.4$ Hz, $J = 9.6$ Hz), 5.64 (br, 1H), 5.21 (t, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.65 (dd, 1H, $J = 3.6$ Hz, $J = 3.2$ Hz), 3.41 (dd, 1H, $J = 5.6$ Hz, $J = 5.6$ Hz), 1.47 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.85, 154.73, 147.12, 136.51, 133.69, 132.51, 129.57, 128.80, 128.15, 123.41, 93.48, 81.19, 80.35, 43.42, 39.88, 28.35.

HRMS calcd. for C₂₂H₂₂N₂O₅Na [M+Na]⁺: 417.1426, found: 417.1422.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 15.1$ min (minor), $t_R = 17.5$ min (major).



(*S*)-tert-butyl 1-(4-chlorophenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4l**

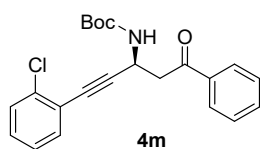
White solid, 81% yield, 33.0 mg. $[\alpha]_D^{20} = -38.0$ (c 0.30 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.97 (d, 2H, $J = 8.0$ Hz), 7.56 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.26-7.19 (m, 4H), 5.56 (br, 1H), 5.18-5.13 (m, 1H), 3.61 (dd, 1H, $J = 3.6$ Hz, $J = 3.2$ Hz), 3.36 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.02, 154.75, 136.71, 134.32, 133.51, 132.98, 128.73, 128.49, 128.17, 121.10, 88.85, 81.96, 80.15, 43.72, 40.02, 28.36.

HRMS calcd. for C₂₂H₂₂ClNO₃Na [M+Na]⁺: 406.1186, found: 406.1187.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.9$ min (minor), $t_R = 16.1$ min (major).



(*S*)-tert-butyl 1-(2-chlorophenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4m**

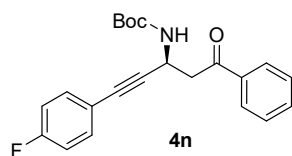
White solid, 67% yield, 27.0 mg. $[\alpha]_D^{20} = -38.8$ (c 0.17 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.97 (d, 2H, $J = 7.6$ Hz), 7.56 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.2$ Hz, $J = 7.6$ Hz), 7.38 (d, 1H, $J = 7.6$ Hz), 7.32 (d, 1H, $J = 8.0$ Hz), 7.22-7.13 (m, 2H), 5.62 (br, 1H), 5.24-5.20 (m, 1H), 3.65 (d, 1H, $J = 3.6$ Hz, $J = 3.6$ Hz), 3.40 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.02, 154.80, 136.76, 136.04, 133.45, 133.42, 129.31, 129.11, 128.70, 128.17, 126.29, 122.53, 93.23, 80.13, 79.86, 43.75, 40.17, 28.37.

HRMS calcd. for C₂₂H₂₂ClNO₃Na [M+Na]⁺: 406.1186, found: 406.1186.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.2$ min (minor), $t_R = 12.2$ min (major).



(*S*)-tert-butyl 1-(4-fluorophenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4n**

White solid, 84% yield, 33.0 mg. $[\alpha]_D^{20} = -46.2$ (c 0.80 CHCl₃).

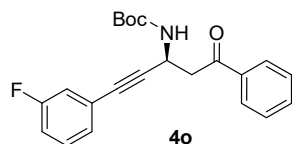
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.90 (d, 2H, $J = 7.2$ Hz), 7.52 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.43 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.25-7.22 (m, 2H), 6.87 (t, 2H, $J = 8.8$ Hz, $J = 8.4$ Hz), 5.51 (br, 1H), 5.10-5.06 (m, 1H), 3.54 (dd, 1H, $J = 3.2$ Hz, $J = 2.8$ Hz), 3.29 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.38 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.11, 163.71, 161.24, 154.77, 136.68, 133.62 (t, $J = 8$ Hz, $J = 10$ Hz), 128.74, 128.18, 118.65 (d, $J = 3$ Hz), 115.43 (d, $J = 22$ Hz), 87.50, 81.98, 80.10, 43.75, 39.90, 28.37.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -110.96.

HRMS calcd. for C₂₂H₂₂FNO₃Na [M+Na]⁺: 390.1481, found: 390.1476.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.3$ min (minor), $t_R = 13.5$ min (major).



(*S*)-tert-butyl 1-(3-fluorophenyl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4o**

White solid, 90% yield, 35.0 mg. $[\alpha]_D^{20} = -31.6$ (c 0.31 CHCl₃).

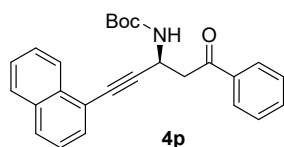
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.98 (d, 2H, $J = 7.2$ Hz), 7.59 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.21 (q, 1H, $J = 6.8$ Hz), 7.11 (d, 1H, $J = 7.6$ Hz), 6.99 (q, 2H, $J = 7.6$ Hz), 5.57 (br, 1H), 5.19-5.14 (m, 1H), 3.61 (dd, 1H, $J = 4.0$ Hz, $J = 3.6$ Hz), 3.37 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.99, 163.46, 161.01, 154.75, 136.70, 133.52, 129.72 (d, $J = 8$ Hz), 128.45 (d, $J = 56$ Hz), 127.64 (d, $J = 3$ Hz), 124.44 (d, $J = 9$ Hz), 118.56 (d, $J = 23$ Hz), 115.64 (d, $J = 21$ Hz), 88.86, 81.82, 80.16, 43.68, 39.96, 28.36.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -113.13.

HRMS calcd. for C₂₂H₂₂FNO₃Na [M+Na]⁺: 390.1481, found: 390.1480.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.1$ min (minor), $t_R = 11.8$ min (major).



(*S*)-tert-butyl 1-(naphthalen-1-yl)-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4p**

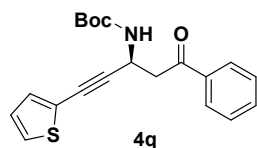
White solid, 80% yield, 32.0 mg. $[\alpha]_D^{20} = -42.0$ (c 1.00 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.22 (d, 1H, $J = 7.6$ Hz), 8.01 (d, 2H, $J = 7.6$ Hz), 7.79 (q, 2H, $J = 8.0$ Hz), 7.58 (q, 2H, $J = 7.6$ Hz), 7.51-7.46 (m, 4H), 7.36 (t, 1H, $J = 7.6$ Hz, $J = 7.6$ Hz), 5.71 (br, 1H), 5.33-5.29 (m, 1H), 3.72 (dd, 1H, $J = 2.8$ Hz, $J = 2.8$ Hz), 3.46 (dd, 1H, $J = 5.6$ Hz, $J = 6.0$ Hz), 1.48 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.31, 154.89, 136.80, 133.52, 133.44, 133.06, 130.51, 128.79, 128.22, 128.14, 126.76, 126.34, 126.23, 125.06, 120.24, 92.74, 81.22, 80.14, 43.89, 40.38, 28.41.

HRMS calcd. for C₂₆H₂₅NO₃Na [M+Na]⁺: 422.1732, found: 422.1730.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.9$ min (minor), $t_R = 13.2$ min (major).



(*S*)-tert-butyl 5-oxo-5-phenyl-1-(thiophen-2-yl)pent-1-yn-3-ylcarbamate **4q**

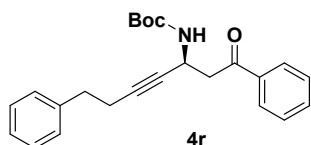
White solid, 84% yield, 30.0 mg. $[\alpha]_D^{20} = -34.0$ (c 1.00 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.90 (d, 2H, $J = 7.2$ Hz), 7.52 (t, 1H, $J = 7.2$ Hz, $J = 7.6$ Hz), 7.41 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.12 (d, 1H, $J = 5.2$ Hz), 7.05 (d, 1H, $J = 3.6$ Hz), 6.84 (q, 1H, $J = 3.6$ Hz), 5.50 (br, 1H), 5.12 (t, 1H, $J = 3.6$ Hz, $J = 4.4$ Hz), 3.54 (dd, 1H, $J = 3.6$ Hz, $J = 4.0$ Hz), 3.30 (dd, 1H, $J = 6.0$ Hz, $J = 5.6$ Hz), 1.38 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.96, 154.73, 136.64, 133.52, 132.25, 128.73, 128.19, 127.09, 126.81, 122.51, 91.68, 80.13, 76.34, 43.68, 40.07, 28.37.

HRMS calcd. for C₂₀H₂₁NO₃Na [M+Na]⁺: 378.1134, found: 378.1137.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.0$ min (minor), $t_R = 13.2$ min (major).



(*S*)-tert-butyl 1-oxo-1,7-diphenylhept-4-yn-3-ylcarbamate **4r**

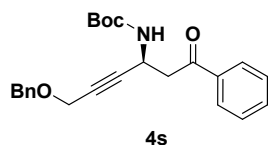
White solid, 80% yield, 30.2 mg. $[\alpha]_D^{20} = -48.0$ (c 1.00 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.95 (d, 2H, $J = 7.6$ Hz), 7.59 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 8.0$ Hz, $J = 7.2$ Hz), 7.21 (t, 2H, $J = 6.8$ Hz, $J = 7.2$ Hz), 7.19-7.13 (m, 3H), 5.39 (br, 1H), 4.89 (d, 1H, $J = 2.4$ Hz), 3.46 (d, 1H, $J = 14.8$ Hz), 3.21 (dd, 1H, $J = 6.4$ Hz, $J = 6.4$ Hz), 2.72 (t, 2H, $J = 7.6$ Hz, $J = 7.2$ Hz), 2.42-2.38 (m, 2H), 1.38 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.32, 154.76, 140.61, 136.78, 133.39, 128.67, 128.46, 128.28, 128.18, 126.20, 82.84, 79.87, 79.47, 43.97, 39.60, 34.89, 28.37, 20.89.

HRMS calcd. for C₂₄H₂₇NO₃Na [M+Na]⁺: 400.1883, found: 400.1879.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.4$ min (minor), $t_R = 11.5$ min (major).



(*S*)-tert-butyl 6-(benzyloxy)-1-oxo-1-phenylhex-4-yn-3-ylcarbamate **4s**

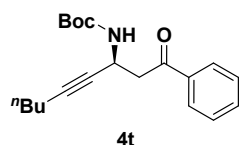
White solid, 79% yield, 31.0 mg. $[\alpha]_D^{20} = -17.7$ (c 0.30 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.95 (d, 2H, $J = 7.6$ Hz), 7.58 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.33-7.29 (m, 5H), 5.52 (br, 1H), 5.01 (s, 1H), 4.52 (s, 2H), 4.12 (s, 2H), 3.54 (d, 1H, $J = 15.2$ Hz), 3.30 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.44 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.05, 154.75, 137.42, 136.63, 133.52, 128.73, 128.38, 128.17, 128.14, 127.81, 85.30, 80.07, 78.87, 71.41, 57.30, 43.66, 39.48, 28.36.

HRMS calcd. for C₂₄H₂₇NO₄Na [M+Na]⁺: 416.1832, found: 416.1833.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 9.3$ min (minor), $t_R = 12.8$ min (major).



(*S*)-tert-butyl 1-oxo-1-phenylnon-4-yn-3-ylcarbamate **4t**

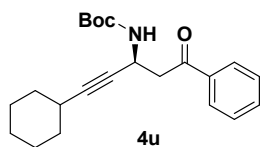
White solid, 75% yield, 25.0 mg. $[\alpha]_D^{20} = -8.7$ (c 0.85 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.96 (d, 2H, $J = 7.6$ Hz), 7.58 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 5.40 (br, 1H), 4.90 (t, 1H, $J = 1.6$ Hz, $J = 2.8$ Hz), 3.50 (d, 1H, $J = 14.4$ Hz), 3.23 (dd, 1H, $J = 6.4$ Hz, $J = 6.4$ Hz), 2.10 (ddd, 2H, $J = 6.8$ Hz, $J = 6.8$ Hz), 1.44 (s, 9H), 1.41-1.35 (m, 2H), 1.33-1.26 (m, 2H), 0.84 (t, 3H, $J = 7.2$ Hz, $J = 7.2$ Hz).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.43, 154.76, 136.88, 133.32, 128.64, 128.18, 83.77, 79.83, 78.47, 44.08, 39.78, 30.56, 28.35, 21.82, 18.28, 13.56.

HRMS calcd. for C₂₀H₂₇NO₃Na [M+Na]⁺: 352.1883, found: 352.1885.

HPLC analysis: Daicel CHIRALCEL IC-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 9.9$ min (major), $t_R = 10.9$ min (minor).



(S)-tert-butyl 1-cyclohexyl-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4u**

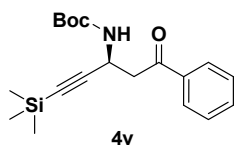
White solid, 82% yield, 29.0 mg. $[\alpha]_D^{20} = -22.6$ (c 0.40 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.96 (d, 2H, $J = 7.6$ Hz), 7.58 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.47 (t, 2H, $J = 7.6$ Hz, $J = 7.2$ Hz), 5.35 (br, 1H), 4.90 (d, 1H, $J = 5.6$ Hz), 3.50 (d, 1H, $J = 14.8$ Hz), 3.21 (dd, 1H, $J = 6.0$ Hz, $J = 6.4$ Hz), 2.29 (s, 1H), 1.68-1.60 (m, 5H), 1.48 (s, 9H), 1.41-1.20 (m, 5H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.44, 154.73, 137.02, 133.25, 128.62, 128.21, 87.98, 79.84, 78.45, 44.28, 39.99, 32.43, 29.70, 28.79, 28.36, 25.83, 24.66.

HRMS calcd. for C₂₂H₂₉NO₃Na [M+Na]⁺: 378.2040, found: 378.2040.

HPLC analysis: Daicel CHIRALCEL IC-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 8.6$ min (major), $t_R = 9.1$ min (minor).



(S)-tert-butyl 5-oxo-5-phenyl-1-(trimethylsilyl)pent-1-yn-3-ylcarbamate **4v**

White solid, 78% yield, 27.0 mg. $[\alpha]_D^{20} = -50.2$ (c 0.15 CHCl₃).

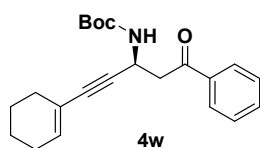
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.87 (d, 2H, $J = 7.6$ Hz), 7.50 (t, 1H, $J = 7.6$ Hz, $J = 7.2$

Hz), 7.39 (t, 2H, $J = 7.2$ Hz, $J = 7.6$ Hz), 5.31 (br, 1H), 4.86 (s, 1H), 3.42 (d, 1H, $J = 14.4$ Hz), 3.16 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.53 (s, 9H), 0.00 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.21, 154.86, 137.12, 133.57, 128.87, 128.41, 104.24, 88.02, 80.24, 43.98, 40.48, 28.55, 0.00.

HRMS calcd. for $\text{C}_{19}\text{H}_{27}\text{NO}_3\text{SiNa}$ $[\text{M}+\text{Na}]^+$: 368.1652, found: 368.1653.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 90/10, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 5.9$ min (minor), $t_{\text{R}} = 6.6$ min (major).



(*S*)-tert-butyl 1-cyclohexenyl-5-oxo-5-phenylpent-1-yn-3-ylcarbamate **4w**

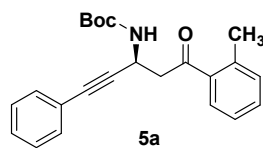
White solid, 93% yield, 33.0 mg. $[\alpha]_{\text{D}}^{20} = -27.3$ (c 0.30 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.96 (d, 2H, $J = 8.0$ Hz), 7.58 (t, 1H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.47 (t, 2H, $J = 7.2$ Hz, $J = 7.6$ Hz), 6.00 (s, 1H), 5.40 (br, 1H), 5.06-5.02 (m, 1H), 3.53 (d, 1H, $J = 15.2$ Hz), 3.27 (dd, 1H, $J = 6.0$ Hz, $J = 6.4$ Hz), 2.02 (s, 4H), 1.53 (d, 4H, $J = 6.4$ Hz), 1.44 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 197.16, 154.70, 136.88, 135.22, 133.31, 128.64, 128.19, 120.03, 84.98, 84.89, 79.90, 44.11, 40.11, 29.01, 28.36, 25.54, 22.20, 21.42.

HRMS calcd. for $\text{C}_{22}\text{H}_{27}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 376.1883, found: 376.1884.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 90/10, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 9.6$ min (minor), $t_{\text{R}} = 11.9$ min (major).



(*S*)-tert-butyl 5-oxo-1-phenyl-5-o-tolylpent-1-yn-3-ylcarbamate **5a**

White solid, 91% yield, 33.0 mg. $[\alpha]_{\text{D}}^{20} = -28.0$ (c 0.70 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.66 (d, 1H, $J = 7.6$ Hz), 7.40-7.34 (m, 3H), 7.29-7.24 (m, 5H), 5.53 (br, 1H), 5.11 (d, 1H, $J = 6.8$ Hz), 3.52 (dd, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.28 (dd, 1H, $J = 6.0$ Hz, $J = 6.4$ Hz), 2.52 (s, 3H), 1.47 (s, 9H).

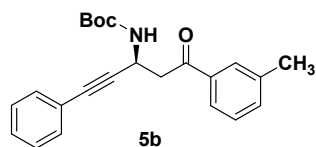
$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 201.21, 154.78, 138.40, 137.60, 132.06, 131.73, 131.62,

128.60, 128.32, 128.19, 125.78, 122.58, 87.84, 83.12, 80.09, 46.67, 40.37, 28.38, 21.22.

HRMS calcd. for C₂₃H₂₅NO₃Na [M+Na]⁺: 386.1732, found: 386.1733.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min,

λ = 254 nm, retention time: t_R = 10.9 min (minor), t_R = 13.9 min (major).



(*S*)-tert-butyl 5-oxo-1-phenyl-5-m-tolylpent-1-yn-3-ylcarbamate **5b**

White solid, 89% yield, 32.0 mg. $[\alpha]_D^{20}$ = -19.5 (c 1.00 CHCl₃).

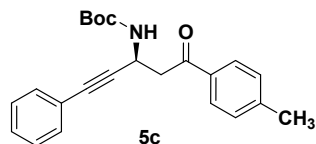
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.78 (d, 2H, J = 9.2 Hz), 7.40-7.33 (m, 4H), 7.25 (d, 3H, J = 6.0 Hz), 5.56 (br, 1H), 5.18-5.14 (m, 1H), 3.60 (dd, 1H, J = 2.8 Hz, J = 3.2 Hz), 3.35 (dd, 1H, J = 6.0 Hz, J = 6.0 Hz), 2.41 (s, 3H), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.30, 154.77, 138.51, 136.85, 134.19, 131.76, 128.70, 128.57, 128.25, 128.14, 125.43, 122.63, 87.89, 83.02, 80.03, 43.89, 40.12, 28.38, 21.34.

HRMS calcd. for C₂₃H₂₅NO₃Na [M+Na]⁺: 386.1732, found: 386.1731.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min,

λ = 254 nm, retention time: t_R = 8.4 min (minor), t_R = 9.6 min (major).



(*S*)-tert-butyl 5-oxo-1-phenyl-5-p-tolylpent-1-yn-3-ylcarbamate **5c**

White solid, 92% yield, 33.4 mg. $[\alpha]_D^{20}$ = -23.5 (c 0.80 CHCl₃).

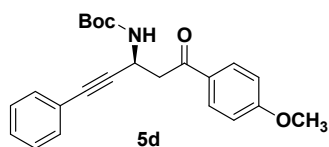
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.88 (d, 2H, J = 8.0 Hz), 7.33 (d, 2H, J = 6.0 Hz), 7.28-7.24 (m, 5H), 5.58 (br, 1H), 5.15 (d, 1H, J = 4.0 Hz), 3.59 (dd, 1H, J = 2.4 Hz, J = 2.4 Hz), 3.33 (dd, 1H, J = 6.0 Hz, J = 5.6 Hz), 2.41 (s, 3H), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.74, 154.79, 144.31, 134.35, 131.76, 129.38, 128.32, 128.24, 128.13, 122.64, 87.91, 82.98, 80.00, 43.71, 40.12, 28.37, 21.67.

HRMS calcd. for C₂₃H₂₅NO₃Na [M+Na]⁺: 386.1732, found: 386.1734.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min,

λ = 254 nm, retention time: t_R = 11.2 min (minor), t_R = 13.2 min (major).



(*S*)-tert-butyl 5-(4-methoxyphenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5d**

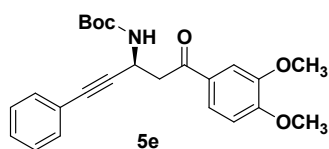
White solid, 89% yield, 34.0 mg. $[\alpha]_D^{20} = -21.2$ (c 1.00 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.96 (d, 2H, $J = 8.4$ Hz), 7.33 (d, 2H, $J = 7.2$ Hz), 7.24 (d, 3H, $J = 6.0$ Hz), 6.94 (d, 2H, $J = 8.4$ Hz), 5.61 (br, 1H), 5.17-5.14 (q, 1H, $J = 4.0$ Hz), 3.87 (s, 3H), 3.57 (dd, 1H, $J = 2.8$ Hz, $J = 2.8$ Hz), 3.29 (dd, 1H, $J = 5.6$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 195.61, 163.78, 154.82, 131.76, 130.53, 129.94, 128.23, 128.13, 122.67, 113.85, 87.99, 82.97, 80.01, 55.51, 43.45, 40.23, 28.38.

HRMS calcd. for C₂₃H₂₅NO₄Na [M+Na]⁺: 402.1681, found: 402.1676.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.8$ min (minor), $t_R = 12.6$ min (major).



(*S*)-tert-butyl 5-(3,4-dimethoxyphenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5e**

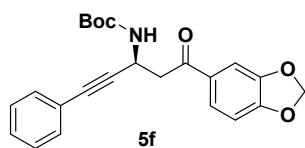
White solid, 94% yield, 38.5 mg. $[\alpha]_D^{20} = -16.6$ (c 0.35 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.61 (d, 1H, $J = 8.4$ Hz), 7.56 (s, 1H), 7.33 (d, 2H, $J = 8.0$ Hz), 7.25 (t, 3H, $J = 4.8$ Hz, $J = 6.0$ Hz), 6.90 (d, 1H, $J = 8.4$ Hz), 5.57 (br, 1H), 5.18-5.14 (m, 1H), 3.94 (d, 6H, $J = 4.8$ Hz), 3.58 (d, 1H, $J = 13.6$ Hz), 3.31 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 195.61, 154.79, 153.63, 149.15, 131.74, 130.08, 128.25, 128.13, 123.07, 122.63, 110.22, 110.11, 87.92, 83.07, 80.02, 56.10, 55.99, 43.43, 40.32, 28.37.

HRMS calcd. for C₂₄H₂₈NO₅ [M+H]⁺: 410.1692, found: 410.1658.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 75/25, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 9.78$ min (minor), $t_R = 12.8$ min (major).



(*S*)-tert-butyl 5-(benzo[d][1,3]dioxol-5-yl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5f**

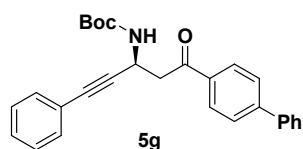
White solid, 86% yield, 34.0 mg. $[\alpha]_D^{20} = -56.8$ (c 0.25 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.57 (d, 1H, $J = 8.0$ Hz), 7.45 (s, 1H), 7.34 (d, 2H, $J = 8.0$ Hz), 7.25 (s, 3H), 6.86 (d, 1H, $J = 8.0$ Hz), 6.04 (s, 2H), 5.56 (br, 1H), 5.14 (q, 1H, $J = 4.0$ Hz), 3.53 (dd, 1H, $J = 4.0$ Hz, $J = 4.0$ Hz), 3.27 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 195.07, 154.77, 152.07, 148.30, 131.75, 131.72, 128.26, 128.15, 124.66, 122.62, 107.94, 107.91, 101.92, 87.87, 83.05, 80.03, 43.64, 40.20, 28.37.

HRMS calcd. for C₂₃H₂₃NO₅Na [M+Na]⁺: 416.1468, found: 416.1463.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.5$ min (minor), $t_R = 13.6$ min (major).



(*S*)-tert-butyl 5-(biphenyl-4-yl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5g**

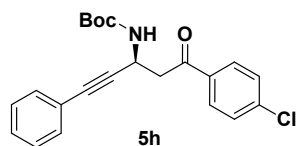
White solid, 95% yield, 40.5 mg. $[\alpha]_D^{20} = -8.5$ (c 0.30 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.05 (d, 2H, $J = 8.0$ Hz), 7.69 (d, 2H, $J = 7.6$ Hz), 7.62 (d, 2H, $J = 8.0$ Hz), 7.47 (t, 2H, $J = 7.6$ Hz, $J = 7.2$ Hz), 7.40 (t, 1H, $J = 7.2$ Hz, $J = 6.8$ Hz), 7.34 (d, 2H, $J = 7.6$ Hz), 7.23 (d, 3H, $J = 4.8$ Hz), 5.58 (br, 1H), 5.19 (t, 1H, $J = 3.6$ Hz, $J = 4.0$ Hz), 3.64 (dd, 1H, $J = 3.6$ Hz, $J = 2.8$ Hz), 3.38 (dd, 1H, $J = 6.0$ Hz, $J = 6.4$ Hz), 1.47 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.70, 154.80, 146.14, 139.80, 135.51, 131.77, 128.99, 128.83, 128.33, 128.30, 128.16, 127.35, 127.29, 122.60, 87.83, 83.17, 80.09, 43.92, 40.20, 28.39.

HRMS calcd. for C₂₈H₂₇NO₃Na [M+Na]⁺: 448.1883, found: 448.1884.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 12.3$ min (minor), $t_R = 13.6$ min (major).



(*S*)-tert-butyl 5-(4-chlorophenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5h**

White solid, 90% yield, 34.5 mg. $[\alpha]_D^{20} = -17.4$ (c 0.20 CHCl₃).

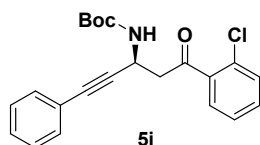
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.92 (d, 2H, $J = 8.4$ Hz), 7.45 (d, 2H, $J = 8.4$ Hz), 7.33 (d, 2H, $J = 7.2$ Hz), 7.7.25 (d, 3H, $J = 7.2$ Hz), 5.48 (s, 1H), 5.15 (d, 1H, $J = 4.0$ Hz), 3.57 (dd, 1H, J

= 3.6 Hz, $J = 3.2$ Hz), 3.33 (dd, 1H, $J = 6.0$ Hz, $J = 6.4$ Hz), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 195.84, 154.73, 139.94, 135.11, 131.73, 129.62, 129.03, 128.37, 128.19, 122.46, 87.54, 83.31, 80.16, 43.97, 40.09, 28.36.

HRMS calcd. for $\text{C}_{22}\text{H}_{22}\text{ClNO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 406.1186, found: 406.1185.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 12.3$ min (minor), $t_{\text{R}} = 16.7$ min (major).



(*S*)-tert-butyl 5-(2-chlorophenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5i**

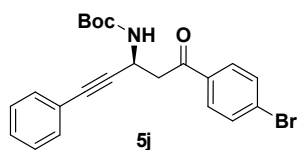
White solid, 88% yield, 34.0 mg. $[\alpha]_{\text{D}}^{20} = -26.4$ (c 0.34 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.53 (d, 1H, $J = 7.6$ Hz), 7.41 (t, 2H, $J = 7.2$ Hz, $J = 6.4$ Hz), 7.37-7.32 (m, 3H), 7.28 (s, 3H), 5.45 (br, 1H), 5.12 (s, 1H), 3.57 (dd, 1H, $J = 4.2$ Hz, $J = 4.2$ Hz), 3.38 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.47 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 200.18, 154.70, 138.85, 132.12, 131.75, 131.19, 130.64, 129.31, 128.37, 128.20, 127.02, 122.51, 116.41, 87.47, 83.28, 80.14, 48.10, 40.16, 28.37.

HRMS calcd. for $\text{C}_{22}\text{H}_{22}\text{ClNO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 406.1186, found: 406.1182.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 10.4$ min (minor), $t_{\text{R}} = 12.8$ min (major).



(*S*)-tert-butyl 5-(4-bromophenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5j**

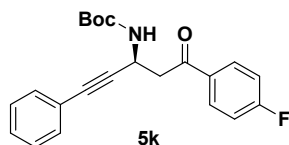
White solid, 66% yield, 28.2 mg. $[\alpha]_{\text{D}}^{20} = -8.5$ (c 0.30 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.84 (d, 2H, $J = 8.4$ Hz), 7.61 (d, 2H, $J = 8.0$ Hz), 7.33 (d, 2H, $J = 7.6$ Hz), 7.25 (d, 3H, $J = 6.4$ Hz), 5.49 (br, 1H), 5.16 (t, 1H, $J = 5.2$ Hz, $J = 7.2$ Hz), 3.57 (dd, 1H, $J = 3.6$ Hz, $J = 3.6$ Hz), 3.32 (dd, 1H, $J = 6.8$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 196.06, 154.73, 135.50, 132.03, 131.73, 129.72, 128.68, 128.38, 128.19, 122.44, 87.52, 83.33, 80.17, 43.96, 40.09, 28.37.

HRMS calcd. for $\text{C}_{22}\text{H}_{22}\text{BrNO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 450.0681, found: 450.0677.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.8$ min (minor), $t_R = 16.0$ min (major).



(*S*)-tert-butyl 5-(4-fluorophenyl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5k**

White solid, 87% yield, 32.0 mg. $[\alpha]_D^{20} = -30.5$ (c 0.30 CHCl₃).

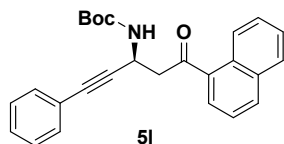
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.03-8.00 (m, 2H), 7.34 (d, 2H, $J = 7.2$ Hz), 7.25 (t, 3H, $J = 6.8$ Hz, $J = 5.6$ Hz), 7.14 (t, 2H, $J = 8.8$ Hz, $J = 8.4$ Hz), 5.53 (d, 1H, $J = 8.4$ Hz), 5.18-5.14 (m, 1H), 3.58 (dd, 1H, $J = 6.8$ Hz, $J = 7.2$ Hz), 3.34 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 195.50, 167.23, 164.69, 154.82, 133.22 (d, $J = 3$ Hz), 132.71 (d, $J = 9$ Hz), 131.73, 130.90 (d, $J = 9$ Hz), 128.27 (d, $J = 18$ Hz), 122.48, 115.83 (d, $J = 22$ Hz), 87.60, 83.22, 80.17, 43.87, 40.09, 28.36.

¹⁹F NMR (376 MHz, CDCl₃): δ (ppm): -104.50.

HRMS calcd. for C₂₂H₂₂FNO₃Na [M+Na]⁺: 390.1481, found: 390.1476.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.6$ min (minor), $t_R = 16.6$ min (major).



(*S*)-tert-butyl 5-(naphthalen-1-yl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5l**

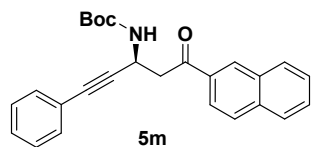
White solid, 97% yield, 38.8 mg. $[\alpha]_D^{20} = -90.0$ (c 0.40 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.66 (d, 1H, $J = 8.0$ Hz), 7.99 (d, 1H, $J = 8.0$ Hz), 7.88 (t, 2H, $J = 7.2$ Hz, $J = 10.8$ Hz), 7.58-7.48 (m, 3H), 7.32 (d, 2H, $J = 7.2$ Hz), 7.29-7.21 (m, 3H), 5.56 (br, 1H), 5.19 (d, 1H, $J = 6.4$ Hz), 3.69 (dd, 1H, $J = 3.6$ Hz, $J = 3.6$ Hz), 3.44 (dd, 1H, $J = 6.4$ Hz, $J = 6.4$ Hz), 1.47 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 201.37, 154.78, 135.64, 134.00, 133.03, 131.74, 130.13, 128.43, 128.34, 128.17, 128.07, 128.00, 127.88, 126.57, 125.82, 124.37, 122.51, 87.78, 83.43, 80.13, 47.17, 40.61, 28.39.

HRMS calcd. for C₂₆H₂₅NO₃Na [M+Na]⁺: 422.1732, found: 422.1727.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.9$ min (minor), $t_R = 13.9$ min (major).



(*S*)-tert-butyl 5-(naphthalen-2-yl)-5-oxo-1-phenylpent-1-yn-3-ylcarbamate **5m**

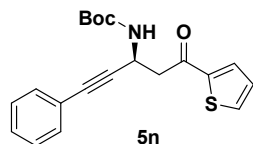
White solid, 88% yield, 35.0 mg. $[\alpha]_D^{20} = -102.0$ (c 0.35 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.48 (s, 1H), 8.04 (d, 1H, $J = 8.8$ Hz), 7.95 (d, 1H, $J = 8.0$ Hz), 7.88 (t, 2H, $J = 9.2$ Hz, $J = 8.8$ Hz), 7.62-7.53 (m, 2H), 7.33 (d, 2H, $J = 7.2$ Hz), 7.22 (d, 3H, $J = 6.8$ Hz), 5.60 (br, 1H), 5.26-5.21 (m, 1H), 3.75 (dd, 1H, $J = 3.2$ Hz, $J = 3.6$ Hz), 3.49 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.03, 154.82, 135.74, 134.16, 132.50, 131.76, 130.12, 129.66, 128.68, 128.59, 128.28, 128.15, 127.80, 126.89, 123.73, 122.60, 87.90, 83.16, 80.08, 43.96, 40.25, 28.40.

HRMS calcd. for C₂₆H₂₅NO₃Na [M+Na]⁺: 422.1732, found: 422.1735.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 16.6$ min (minor), $t_R = 18.1$ min (major).



(*S*)-tert-butyl 5-oxo-1-phenyl-5-(thiophen-2-yl)pent-1-yn-3-ylcarbamate **5n**

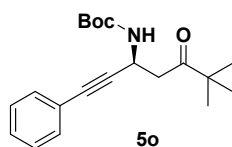
White solid, 87% yield, 31.0 mg. $[\alpha]_D^{20} = -32.6$ (c 1.00 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.76 (d, 1H, $J = 3.6$ Hz), 7.66 (d, 1H, $J = 4.8$ Hz), 7.32 (d, 2H, $J = 7.6$ Hz), 7.27-7.24 (m, 3H), 7.14 (t, 1H, $J = 4.0$ Hz, $J = 4.2$ Hz), 5.55 (s, 1H), 5.16-5.12 (m, 1H), 3.54 (t, 1H, $J = 3.2$ Hz, $J = 12.4$ Hz), 3.28 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 1.46 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 189.94, 154.77, 144.19, 134.28, 132.64, 131.76, 128.34, 128.27, 128.16, 122.50, 87.44, 83.44, 80.14, 44.52, 40.35, 28.36.

HRMS calcd. for C₂₀H₂₁NO₃SNa [M+Na]⁺: 378.1134, found: 378.1134.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 10.3$ min (minor), $t_R = 14.8$ min (major).



(*S*)-tert-butyl 6,6-dimethyl-5-oxo-1-phenylhept-1-yn-3-ylcarbamate **5o**

White solid, 45% yield, 15.0 mg. $[\alpha]_D^{20} = -67$ (c 0.15 CHCl₃).

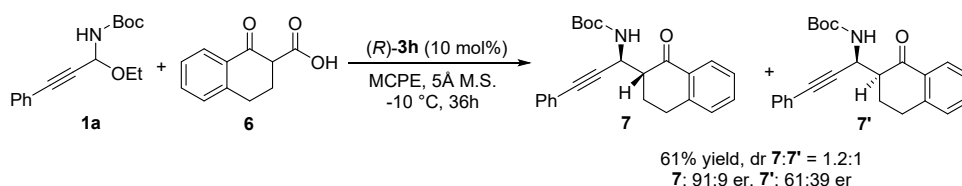
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.36 (d, 2H, *J* = 8.0 Hz), 7.28 (s, 3H), 5.59 (br, 1H), 5.01-4.97 (m, 1H), 3.15 (t, 1H, *J* = 2.8 Hz, *J* = 14.4 Hz), 2.85 (dd, 1H, *J* = 6.0 Hz, *J* = 5.6 Hz), 1.46 (s, 9H), 1.16 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 196.88, 154.81, 131.68, 128.23, 128.19, 122.72, 88.07, 82.46, 79.92, 44.36, 41.80, 40.08, 28.37, 25.97.

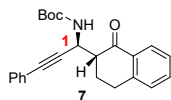
HRMS calcd. for C₂₀H₂₇NO₃Na [M+Na]⁺: 352.1889, found: 352.1890.

HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 6.5$ min (minor), $t_R = 7.8$ min (major).

General procedure for the catalytic asymmetric decarboxlative Mannich reaction of *C*-phenyl-*N*-Boc-*N,O*-acetal **1a with cyclic β -Keto acids **6****



To a solution of *C*-phenyl-*N*-Boc-*N,O*-acetal **1a** (0.1 mmol) and **6** (0.12 mmol) in MCPE (1.0 mL) was added the catalyst **3h** (7.8 mg, 10 mol %) and 5 Å MS (100 mg) at room temperature. The reaction mixture was stirred at -10 °C, until **1a** was consumed. The mixture was directly purified by silica gel chromatography (ethyl acetate/petroleum ether = 1/50 to 1/10) to afford the product **7** and **7'**.



(1*S*)-tert-butyl 1-(1-oxo-1,2,3,4-tetrahydronaphthalen-2-yl)-3-phenylprop-2-ynylcarbamate **7**

White solid, 61% yield, 23.0 mg. $[\alpha]_D^{20} = -60.5$ (c 0.40 CHCl₃).

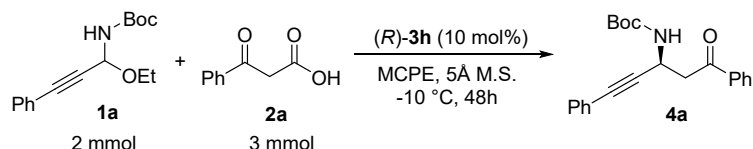
¹H-NMR (600 MHz, CDCl₃): δ (ppm): 8.05 (d, 1H, *J* = 7.2 Hz), 7.48 (t, 1H, *J* = 7.2 Hz, *J* = 7.8 Hz), 7.36-730 (m, 3H), 7.27-7.23 (m, 4H), 5.34 (dd, 1H, *J* = 3.6 Hz, *J* = 3.6 Hz), 5.18 (br, 1H), 3.14-3.08 (m, 2H), 3.06 (d, 1H, *J* = 3.6 Hz), 2.36-2.26 (m, 2H), 1.46 (s, 9H).

$^{13}\text{C-NMR}$ (150 MHz, CDCl_3): δ (ppm): 196.79, 154.86, 143.72, 133.54, 132.61, 131.77, 128.75, 128.29, 128.16, 127.52, 126.74, 122.61, 86.96, 83.86, 80.07, 52.59, 43.88, 28.63, 28.36, 25.54.

HRMS calcd. for $\text{C}_{24}\text{H}_{25}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 398.1727, found: 398.1724.

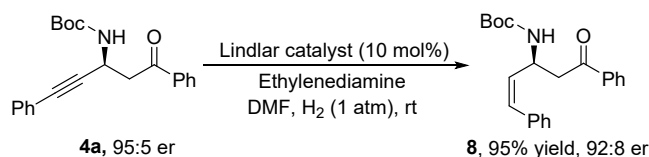
HPLC analysis: Daicel CHIRALCEL AD-3, *n*-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_{\text{R}} = 10.1$ min (minor), $t_{\text{R}} = 10.7$ min (major).

Large-Scale catalytic asymmetric reactions

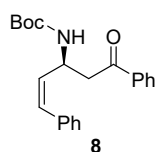


To a solution of **1a** (2 mmol) and **2a** (3 mmol) in MCPE (20 mL) was added the catalyst **3h** (156 mg, 10 mol %) and 5 Å MS (2.0 g) at room temperature. After *C*-alkynyl-*N*-Boc-*N,O*-acetal **1a** was consumed, the mixture was directly purified by silica gel chromatography (ethyl acetate/petroleum ether = 1/50 to 1/10) to afford the product **4a**.

Procedure for the synthesis of compound **8**



An oven-dried 10 mL Schlenk tube equipped with a stirring bar and capped with a rubber septum was charged with Lindlar catalyst/ CaCO_3 (0.01 mmol Pd). The tube was degassed and backfilled with hydrogen gas (3 times). Under a positive hydrogen pressure (hydrogen-filled balloon), degassed DMF (1 mL) and ethyldiene (1.2 eq) were added into the tube via a syringe, followed by the addition of **4a** (35 mg, 0.1 mmol). The reaction mixture was stirred at room temperature under a hydrogen atmosphere (hydrogen-filled balloon). Upon completion of the reaction in 12 h (monitored by TLC), the reaction mixture was filtered with a pad of celite to remove Lindlar catalyst, and the filtrate was concentrated in vacuo. The organic layer was further purified by flash column chromatography on silica gel (eluting with petroleum ether/ethyl acetate = 8:1) to give **8**.



(S,Z)-tert-butyl 5-oxo-1,5-diphenylpent-1-en-3-ylcarbamate **8**

White solid, 95% yield, 33.3 mg. $[\alpha]_D^{20} = -42.5$ (c 0.20 CHCl₃).

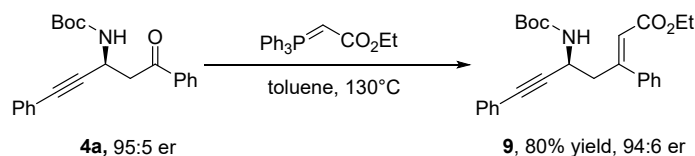
¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.88-7.85(m, 2H), 7.56-7.52(m, 1H), 7.43-7.40 (m, 2H), 7.35-7.30(m, 4H), 7.27-7.22 (m, 1H), 6.48 (d, 1H, $J = 12.0$ Hz), 5.88 (t, 1H, $J = 10.0$ Hz, $J = 10.4$ Hz), 5.38 (br, 1H), 5.17-5.10 (m, 1H), 3.41 (d, 1H, $J = 13.2$ Hz), 3.21 (dd, 1H, $J = 5.2$ Hz, $J = 5.2$ Hz), 1.40 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 198.62, 155.03, 136.81, 136.38, 133.33, 131.45, 130.68, 128.63, 128.61, 128.48, 128.15, 127.26, 79.49, 45.87, 43.58, 28.37.

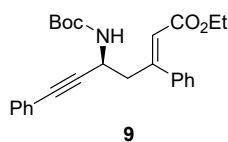
HRMS calcd. for C₂₂H₂₆NO₃ [M+H]⁺: 352.1907, found: 374.1706.

HPLC analysis: Daicel CHIRALCEL AD-3, n-hexane/i-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 11.6$ min (minor), $t_R = 13.8$ min (major).

Procedure for the synthesis of compound 9



An oven-dried 10 mL Schlenk tube equipped with a stirring bar and capped with a rubber septum was charged with **4a** (35 mg, 0.1 mmol) and tert-butyl 2-(triphenyl- λ -phosphanylidene)acetate (4eq, 0.4 mmol). The tube was degassed and backfilled with N₂ (3 times). Under a positive N₂ pressure (N₂-filled balloon), degassed toluene (3 mL) were added into the tube via a syringe. The reaction mixture was stirred at 130°C under a N₂ atmosphere (N₂-filled balloon). After **4a** was consumed (monitored by TLC), the organic layer was further purified by flash column chromatography on silica gel (eluting with petroleum ether/ethyl acetate = 3:1) to give **9**.



Ethyl- (*S,Z*)-5-((tert-butoxycarbonyl)amino)-3,7-diphenylhept-2-en-6-ynoate **9**

White solid, 80% yield, 33.5 mg. $[\alpha]_D^{20} = -54.6$ (c 0.10 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 7.46 (dd, 2H, $J = 4.4$ Hz, $J = 1.6$ Hz), 7.38 (d, 3H, $J = 5.2$ Hz), 7.34 (dd, 2H, $J = 1.6$ Hz, $J = 3.2$ Hz), 7.27 (t, 3H, $J = 1.6$ Hz, $J = 6.8$ Hz), 6.17 (s, 1H), 5.16(d, 1H, $J = 7.2$ Hz), 4.70 (d, 1H, $J = 5.6$ Hz), 4.25-4.18 (m, 2H), 3.81 (dd, 1H, $J = 9.2$ Hz, $J =$

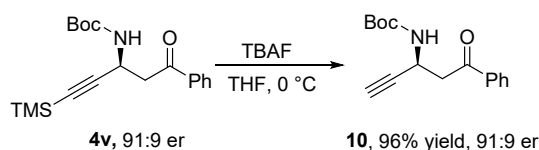
9.2 Hz), 3.46 (t, 1H, $J = 6.8$ Hz, $J = 5.2$ Hz), 1.41 (s, 9H), 1.30 (t, 3H, $J = 7.2$ Hz, $J = 7.2$ Hz)

$^{13}\text{C-NMR}$ (150 MHz, CDCl_3): δ (ppm): 165.86, 154.19, 153.77, 139.33, 130.69, 128.21, 127.69, 127.15, 127.12, 125.90, 121.76, 119.50, 87.37, 82.08, 78.44, 59.23, 41.69, 35.83, 27.29, 13.23.

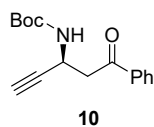
HRMS calcd. for $\text{C}_{26}\text{H}_{29}\text{NO}_4\text{Na}$ $[\text{M}+\text{Na}]^+$: 442.1989, found: 442.1989.

HPLC analysis: Daicel CHIRALCEL IC-3, n-hexane/*i*-PrOH = 80/20, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 5.0$ min (minor), $t_R = 5.8$ min (major).

Procedure for the synthesis of compound 10



In an ordinary vial, equipped with a stir bar, was charged with **4v** (35 mg, 0.1 mmol). Freshly distilled THF (2 mL) was added and the solution was cooled to 0 °C. TBAF (1M in THF, 0.24 mL, 0.24 mmol, 2.4 equiv) was added dropwise and the solution was stirred another 3 min. After completion of the reaction, the resulting brown solution was quenched with saturated aqueous NH_4Cl (5.0 mL) at 0 °C. The layers were separated, and the aqueous layer was extracted with EtOAc (3×10 mL). The combined organic layers were washed with brine (10 mL), dried over Na_2SO_4 and concentrated in vacuo. The residue was then purified by silica gel chromatography (eluting with petroleum ether/ethyl acetate = 3:1) to afford purified **10**.



(*S*)-tert-butyl 5-oxo-5-phenylpent-1-yn-3-ylcarbamate **10**

White solid, 96% yield, 26.2 mg. $[\alpha]_D^{20} = -29.2$ (c 0.13 CHCl_3).

$^1\text{H-NMR}$ (400 MHz, CDCl_3): δ (ppm): 7.96 (d, 2H, $J = 8.0$ Hz), 7.59 (t, 1H, $J = 7.2$ Hz, $J = 14.4$ Hz), 7.48 (t, 2H, $J = 7.6$ Hz, $J = 15.2$ Hz), 5.52 (br, 1H), 4.95 (s, 1H), 3.45 (t, 1H, $J = 2.4$ Hz, $J = 17.2$ Hz), 3.32 (dd, 1H, $J = 6.0$ Hz, $J = 6.0$ Hz), 2.28 (s, 1H), 1.44 (s, 9H).

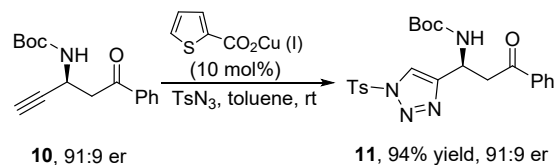
$^{13}\text{C-NMR}$ (100 MHz, CDCl_3): δ (ppm): 196.95, 154.73, 136.55, 133.56, 128.72, 128.13, 82.51, 80.14, 71.10, 43.46, 39.15, 28.34.

HRMS calcd. for $\text{C}_{16}\text{H}_{19}\text{NO}_3\text{Na}$ $[\text{M}+\text{Na}]^+$: 296.1257, found: 296.1255.

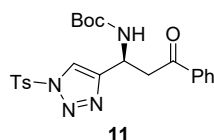
HPLC analysis: Daicel CHIRALCEL AD-3, n-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min,

$\lambda = 254$ nm, retention time: $t_R = 11.4$ min (minor), $t_R = 15.1$ min (major).

Procedure for the synthesis of compound **11**



A flame dried 5 mL vial, equipped with a stir bar, was charged with **10** (20.1 mg, 0.058 mmol, 1.00 equiv) and freshly distilled toluene (1.5 mL). Tosyl azide (23 mg, 1.2 equiv) was added to the solution at rt. And Copper(I) thiophene-2-carboxylate (1.4 mg, 0.1 equiv) was added, respectively. After stirring for 12 h, the reaction mixture was monitored by TLC. The mixture was then purified by silica gel chromatography (PE:AcOEt = 5:1) to afford purified **11**.



(*S*)-tert-butyl (3-oxo-3-phenyl-1-(1-tosyl-1H-1,2,3-triazol-4-yl)propyl)carbamate **11**

White solid, 94% yield, 44.2mg. $[\alpha]_D^{20} = -32.5$ (c 0.30 CHCl₃).

¹H-NMR (400 MHz, CDCl₃): δ (ppm): 8.13 (s, 1H), 7.94 (d, 2H, $J = 8.0$ Hz), 7.88 (d, 2H, $J = 7.6$ Hz), 7.56 (t, 1H, $J = 7.2$ Hz, $J = 7.2$ Hz), 7.43 (t, 2H, $J = 7.6$ Hz, $J = 7.6$ Hz), 7.36 (d, 2H, $J = 8.0$ Hz), 5.86 (d, 1H, $J = 7.2$ Hz), 5.43 (s, 1H), 3.87 (d, 1H, $J = 16.8$ Hz), 3.55 (dd, 1H, $J = 5.6$ Hz, $J = 5.6$ Hz), 2.43 (s, 3H), 1.43 (s, 9H).

¹³C-NMR (100 MHz, CDCl₃): δ (ppm): 197.84, 155.12, 148.26, 147.29, 136.39, 133.57, 132.99, 130.43, 128.73, 128.67, 128.05, 126.43, 121.70, 80.12, 43.82, 42.26, 29.70, 28.33, 21.82.

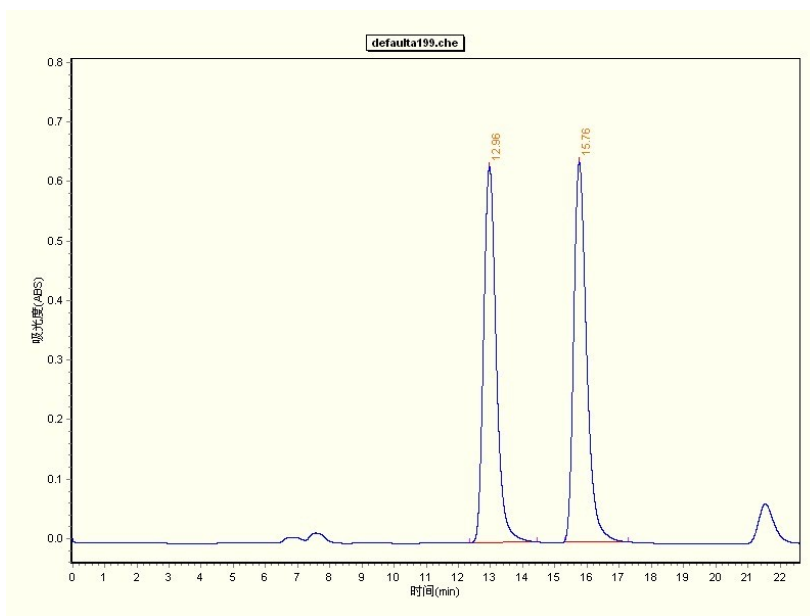
HRMS calcd. for C₂₃H₂₆N₄O₅SSNa [M+Na]⁺: 493.1522, found: 493.1520.

HPLC analysis: Daicel CHIRALCEL AD-3, n-hexane/*i*-PrOH = 85/15, flow rate = 1.0 mL/min, $\lambda = 254$ nm, retention time: $t_R = 25.3$ min (minor), $t_R = 28.5$ min (major).

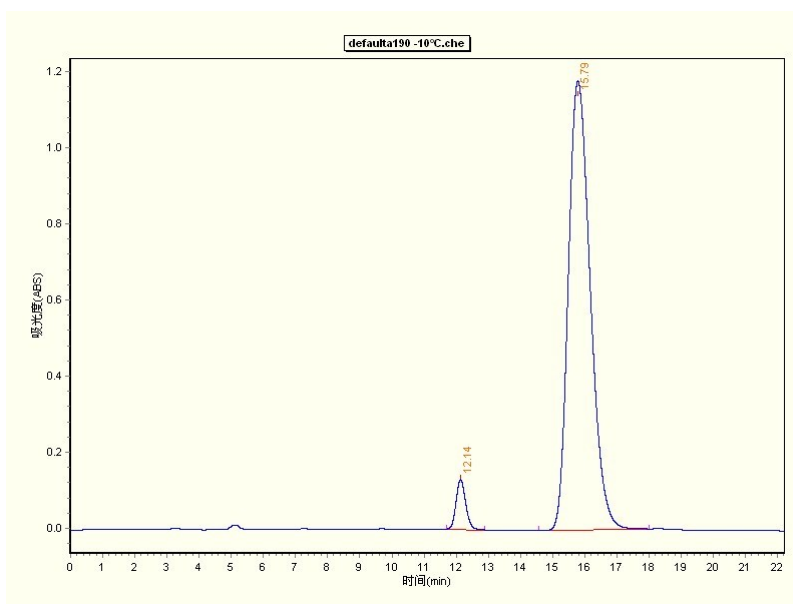
References

- [1] Y.-C. Wang, M.-J. Mo, K.-X. Zhu, C. Zheng, H.-B. Zhang, W. Wang and Z.-H. Shao, *Nat. Commun.* 2015, **6**, 8544.
- [2] X.-L. Xu, H.-H. Chen, J.-B. He and H.-J. Xu. *Chin. J. Chem.*, 2017, **35**, 1665 – 1668.

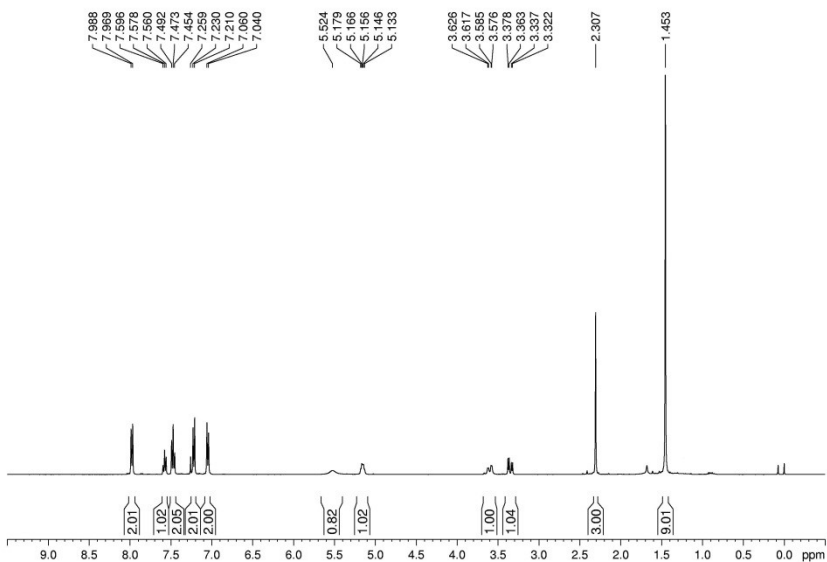
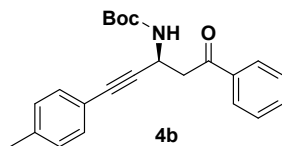
Copies of NMR and HPLC



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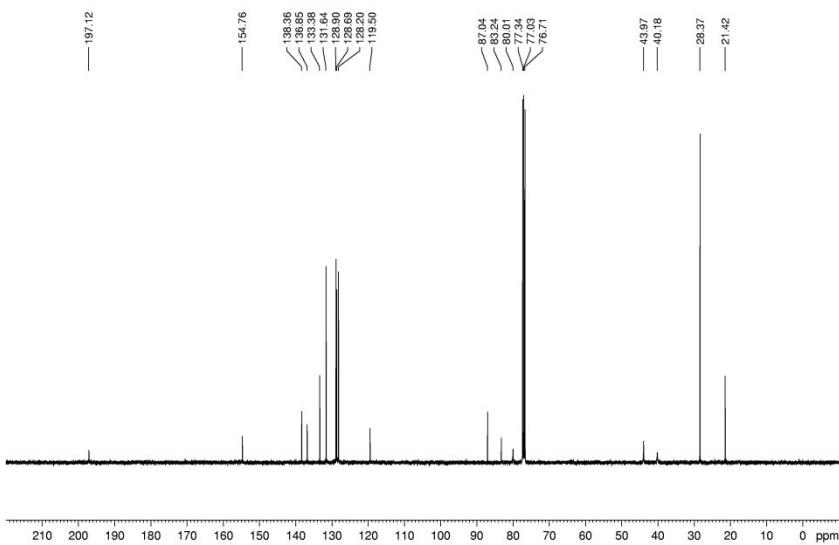


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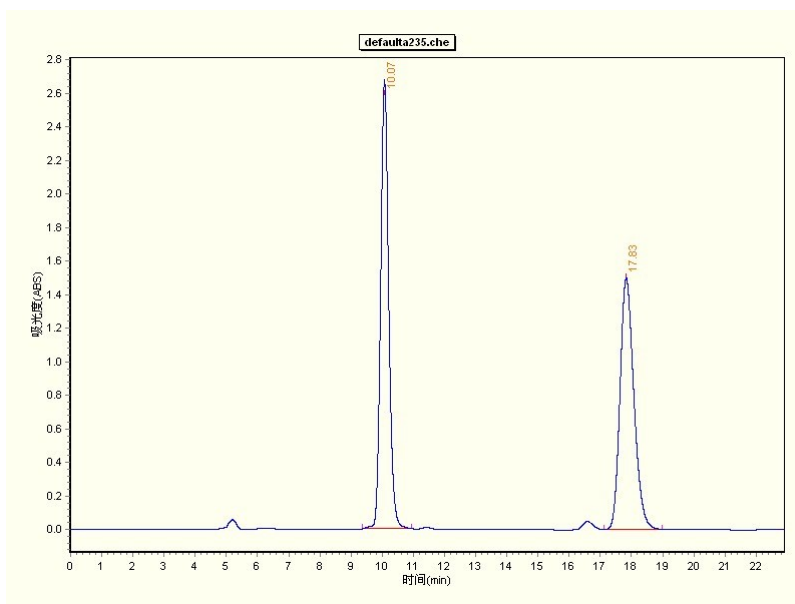
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PROCNO   1
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PULPROG  zgpg30
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SOLVENT  CDCl3
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SHE      555.556 Hz
FIDRES   0.169542 Hz
AQ       5.8982902 sec
RG       101
DM       90.000 usec
DE       9.46 usec
TE       298.3 K
D1       1.00000000 sec
TD0      400.1321847 MHz
SFO1     13C
NUC1     13C
PQ       3.20 usec
PI       10.50 usec
SI       65536
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LB       0.30 Hz
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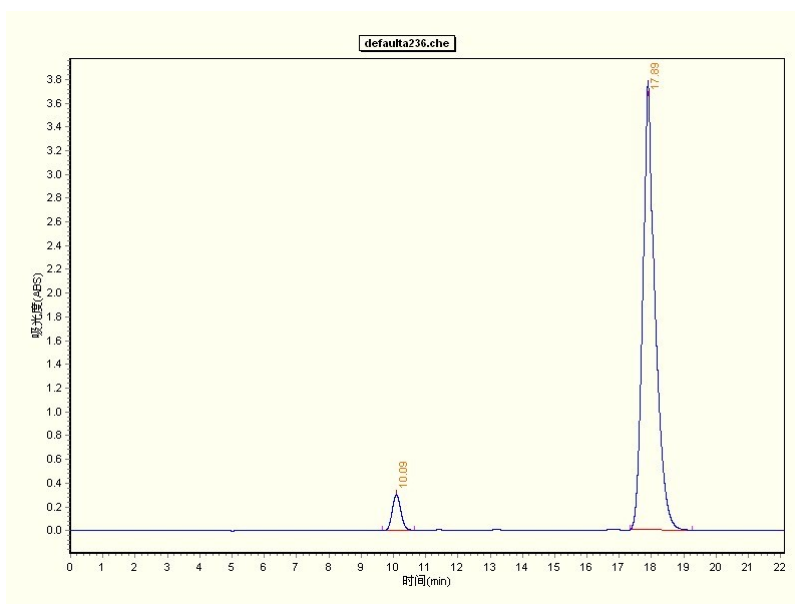


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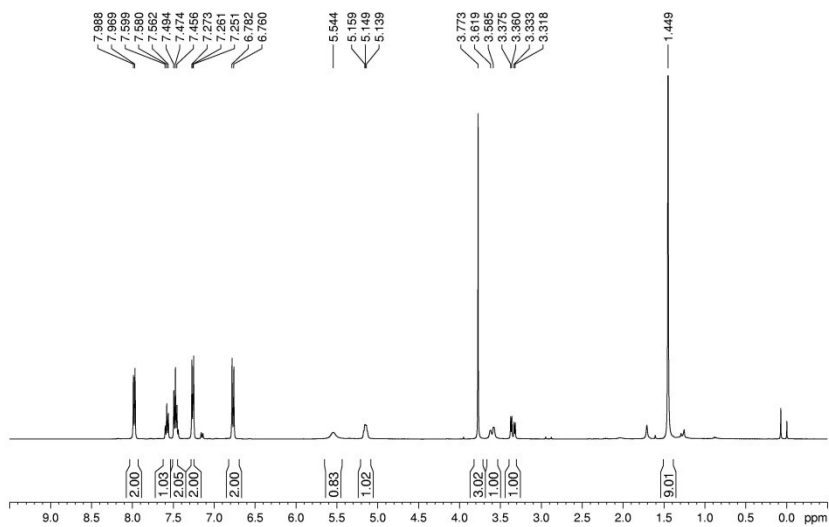
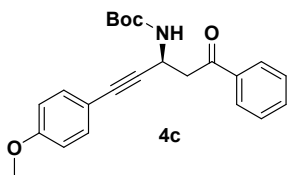
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EXPNO    2
PROCNO   1
F2 - Time 20200410
Time     14.22 h
INSTRUM  Avance
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PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SHE      25001.000 Hz
FIDRES   0.762939 Hz
AQ       1.3137700 sec
RG       101
DM       20.000 usec
DE       6.50 usec
TE       298.3 K
D1       2.00000000 sec
D11      0.13000000 sec
TD0      100.6238459 MHz
SFO1     13C
NUC1     13C
PQ       9.23 usec
PI       9.50 usec
SI       32768
SF       100.6127685 MHz
NUC2     13C
SFB      0
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PC       1.40
  
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Entry	Retention time	Area	Height	Area%	Width	Type
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2	17.83	23064024	748388	48.98%	1.880	BB

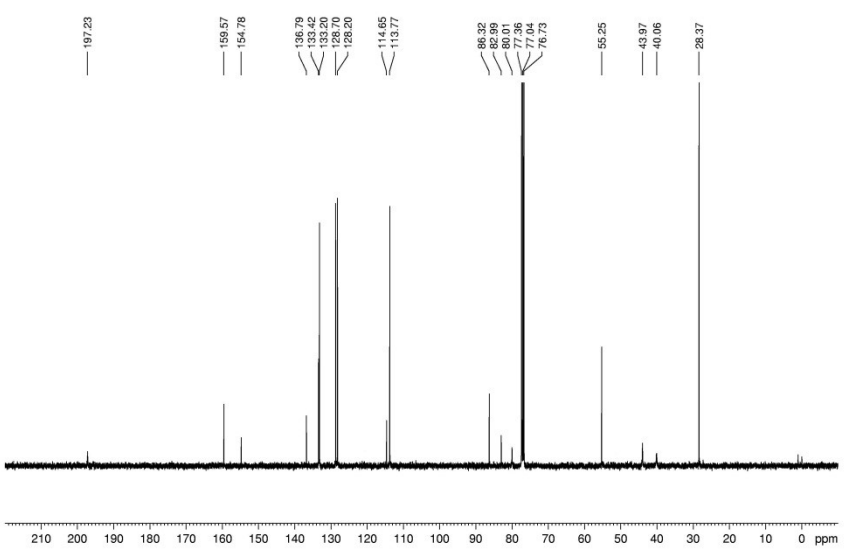


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1	10.09	2757135	150609	5.24%	0.999	BB
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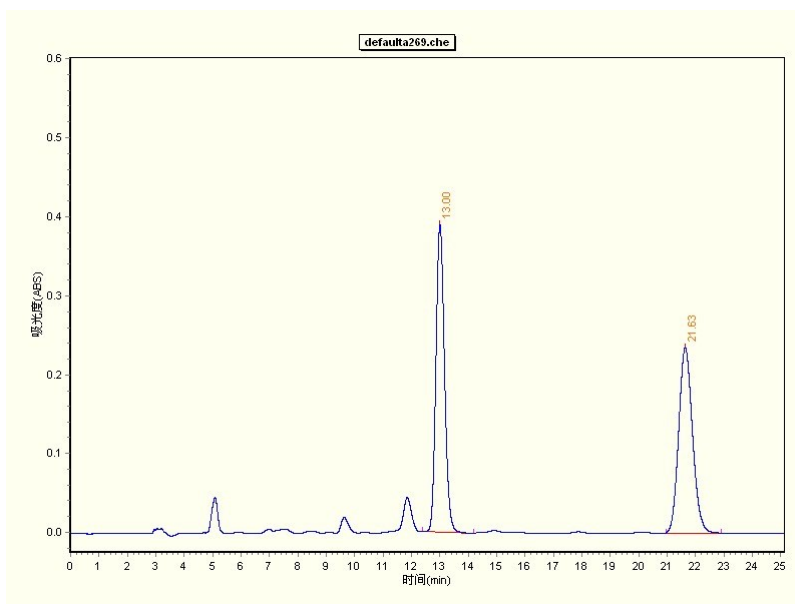
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PULPROG   zg30
TD         65536
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DS         0
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FIDRES    0.122246 Hz
AQ         4.4894846 sec
RG         55.34
DM         62.400 usec
DE         6.50 usec
TE         292.4 K
D1         1.0000000 sec
TD0
----- CHANNEL f1 -----
SFO1      400.1522008 MHz
NUC1      13
P1         15.75 usec
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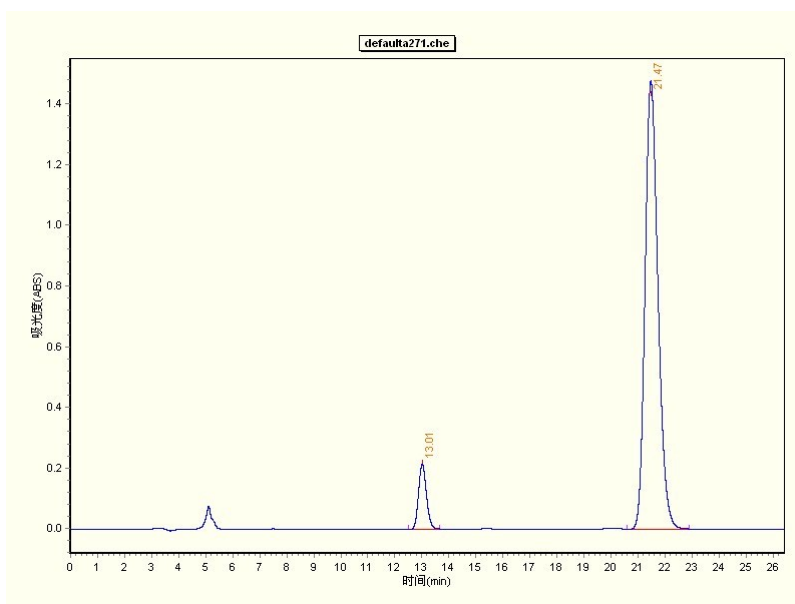


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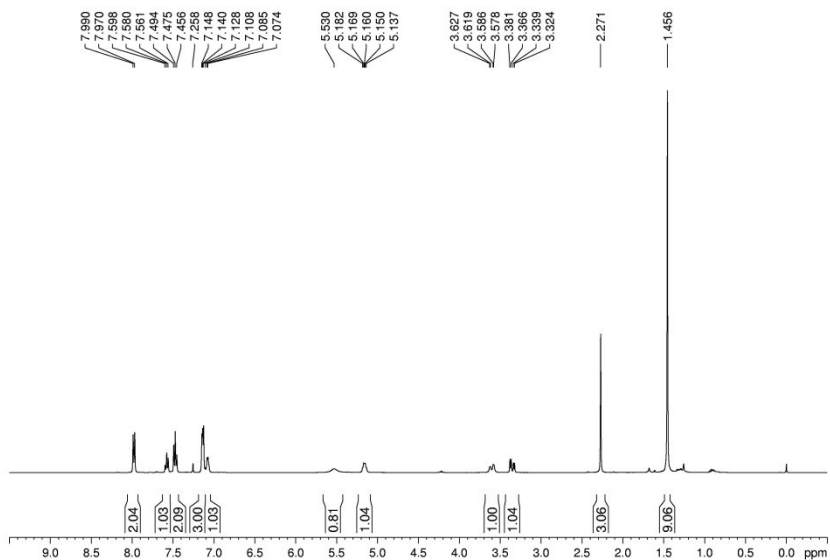
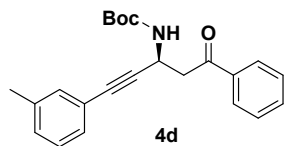
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RG         233.44
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DE         6.00 usec
TE         293.0 K
D1         2.0000000 sec
D11        0.8360000 sec
TD0
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SFO1      100.6284628 MHz
NUC1      13
P1         15.25 usec
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Entry	Retention time	Area	Height	Area%	Width	Type
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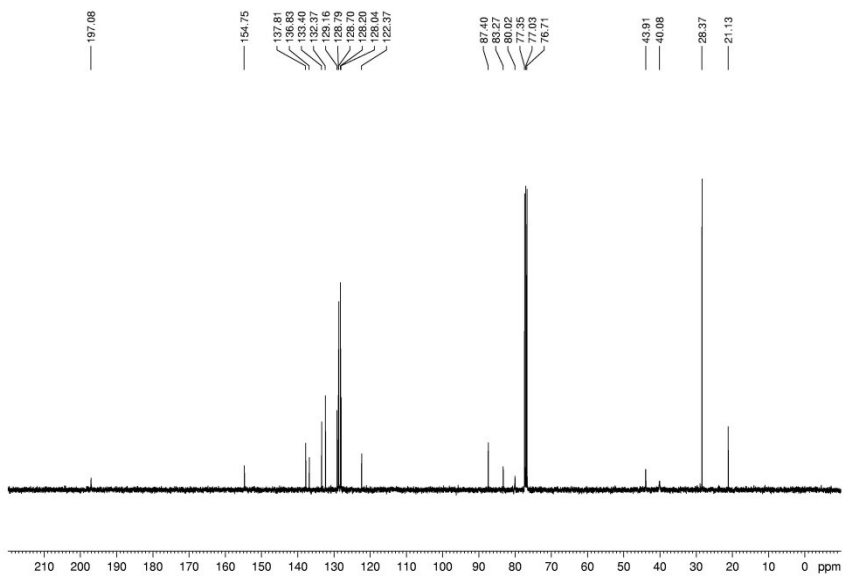


Entry	Retention time	Area	Height	Area%	Width	Type
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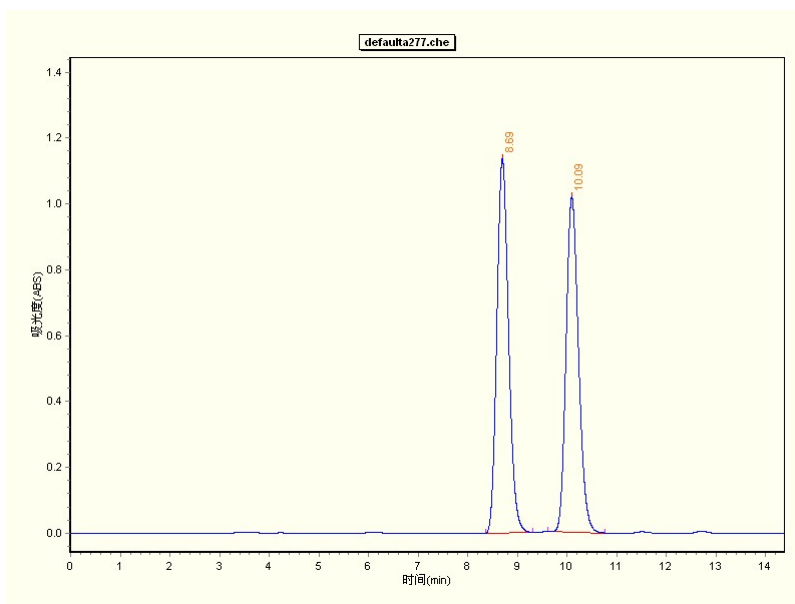
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NS 8
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FIDRES 0.169542 Hz
AQ 5.898290 sec
RG 101
SW 90.000 usec
DE 3.46 usec
TE 298.2 K
D1 1.0000000 sec
TD0
SFO1 400.1321847 MHz
NUC1 13C
PD 3.50 usec
PI 19.20 usec
SI 65536
SF 400.1301218 MHz
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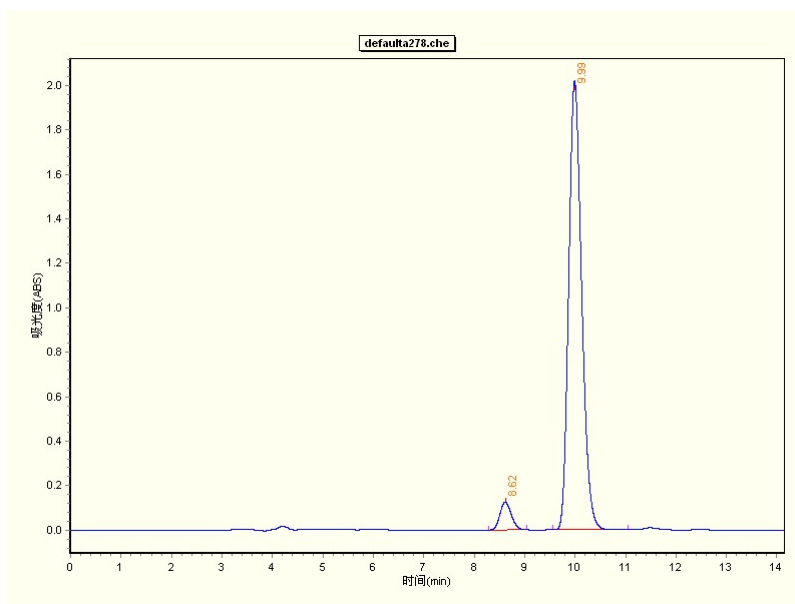


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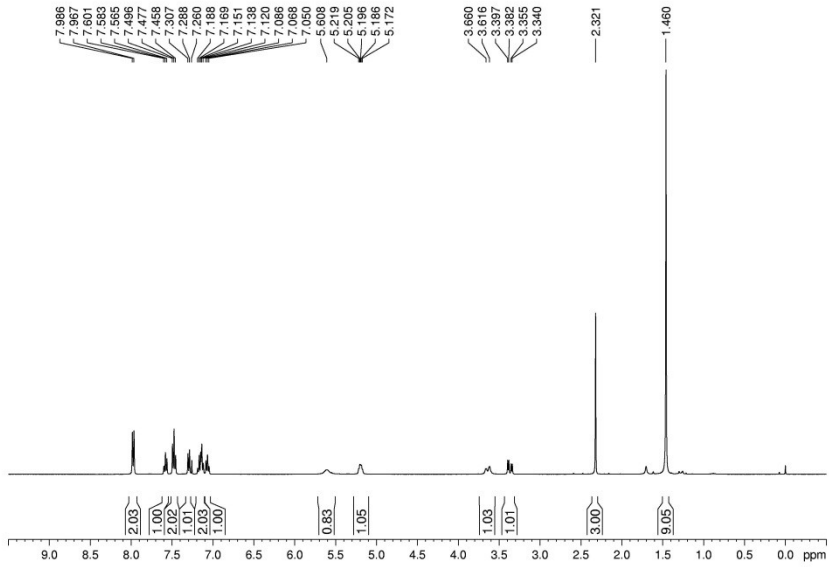
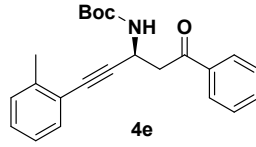
NAME raw400M
EXPNO 69
PROCNO 1
Date_ 20200510
Time 13.44 h
INSTRUM Avance
PROBHD 216098_081 4
PULPROG zgpg30
TD 65536
SOLVENT CDCl3
NS 194
DS 0
SWH 25002.000 Hz
FIDRES 0.768329 Hz
AQ 1.1107700 sec
RG 58.6874
SW 20.000 usec
DE 3.46 usec
TE 298.2 K
D1 2.0000000 sec
D11 0.0300000 sec
TD0
SFO1 100.6233350 MHz
NUC1 13C
PD 3.17 usec
PI 3.20 usec
SI 32768
SF 100.6127685 MHz
WDM EM
SFB 1.00 Hz
GB 0
PC 1.40
  
```

Entry	Retention time	Area	Height	Area%	Width	Type
1	8.69	9317621	568398	51.26%	0.954	BB
2	10.09	8857881	508823	48.74	1.154	BB

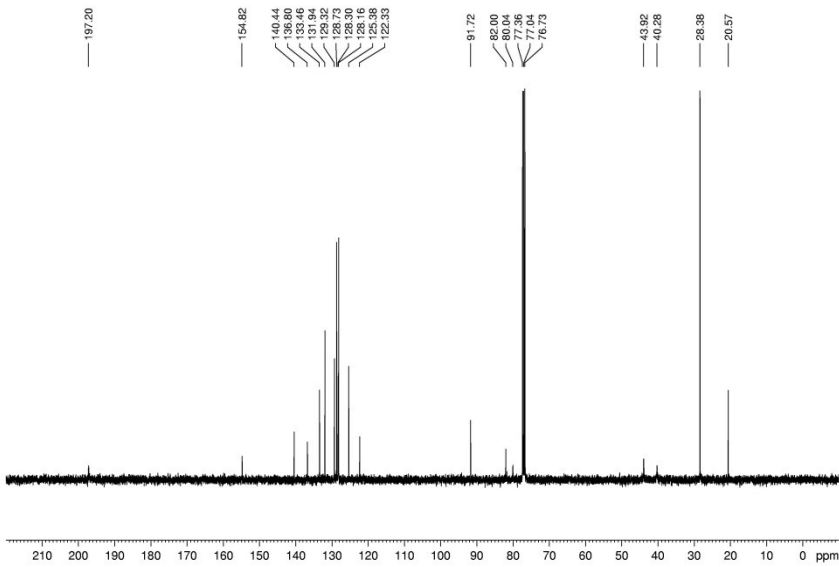


Entry	Retention time	Area	Height	Area%	Width	Type
1	8.62	982961	62663	5.18%	0.741	BB
2	9.99	17981967	1009698	94.82%	1.497	BB



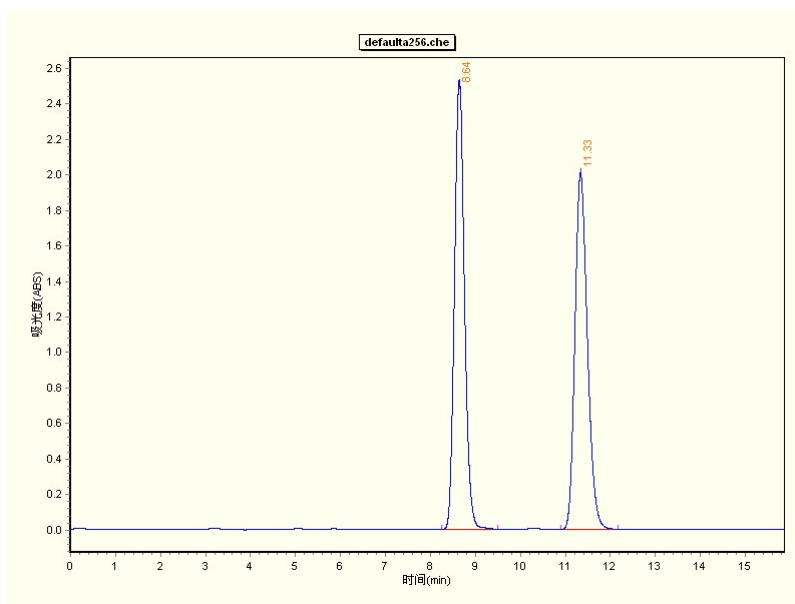
```

NAME      new4004
EXPNO    1
PROCNO   47
Date_    20200430
Time     14.20 h
INSTRUM  Avance
PROBHD   5mmBBO
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       5555.156 Hz
F2RES    0.14890 Hz
AQ        5.8982300 sec
RG        56.111
WDW       20.000 usec
SS        3.46 usec
TE        294.2 K
D1        1.0000000 sec
D11       0.0300000 sec
D12       0.0300000 sec
D13       0.0300000 sec
D14       0.0300000 sec
D15       0.0300000 sec
D16       0.0300000 sec
D17       0.0300000 sec
D18       0.0300000 sec
D19       0.0300000 sec
D20       0.0300000 sec
D21       0.0300000 sec
D22       0.0300000 sec
D23       0.0300000 sec
D24       0.0300000 sec
D25       0.0300000 sec
D26       0.0300000 sec
D27       0.0300000 sec
D28       0.0300000 sec
D29       0.0300000 sec
D30       0.0300000 sec
D31       0.0300000 sec
D32       0.0300000 sec
D33       0.0300000 sec
D34       0.0300000 sec
D35       0.0300000 sec
D36       0.0300000 sec
D37       0.0300000 sec
D38       0.0300000 sec
D39       0.0300000 sec
D40       0.0300000 sec
D41       0.0300000 sec
D42       0.0300000 sec
D43       0.0300000 sec
D44       0.0300000 sec
D45       0.0300000 sec
D46       0.0300000 sec
D47       0.0300000 sec
D48       0.0300000 sec
D49       0.0300000 sec
D50       0.0300000 sec
D51       0.0300000 sec
D52       0.0300000 sec
D53       0.0300000 sec
D54       0.0300000 sec
D55       0.0300000 sec
D56       0.0300000 sec
D57       0.0300000 sec
D58       0.0300000 sec
D59       0.0300000 sec
D60       0.0300000 sec
D61       0.0300000 sec
D62       0.0300000 sec
D63       0.0300000 sec
D64       0.0300000 sec
D65       0.0300000 sec
D66       0.0300000 sec
D67       0.0300000 sec
D68       0.0300000 sec
D69       0.0300000 sec
D70       0.0300000 sec
D71       0.0300000 sec
D72       0.0300000 sec
D73       0.0300000 sec
D74       0.0300000 sec
D75       0.0300000 sec
D76       0.0300000 sec
D77       0.0300000 sec
D78       0.0300000 sec
D79       0.0300000 sec
D80       0.0300000 sec
D81       0.0300000 sec
D82       0.0300000 sec
D83       0.0300000 sec
D84       0.0300000 sec
D85       0.0300000 sec
D86       0.0300000 sec
D87       0.0300000 sec
D88       0.0300000 sec
D89       0.0300000 sec
D90       0.0300000 sec
D91       0.0300000 sec
D92       0.0300000 sec
D93       0.0300000 sec
D94       0.0300000 sec
D95       0.0300000 sec
D96       0.0300000 sec
D97       0.0300000 sec
D98       0.0300000 sec
D99       0.0300000 sec
D100      0.0300000 sec
  
```

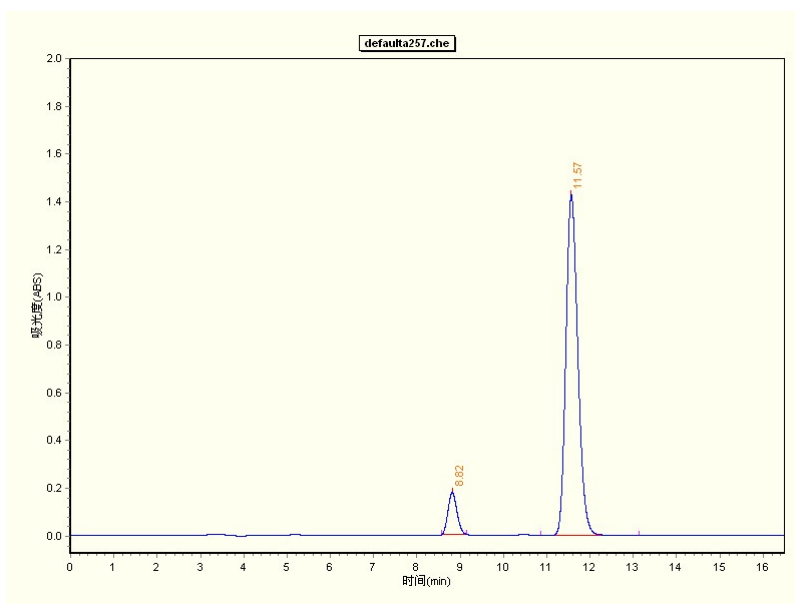


```

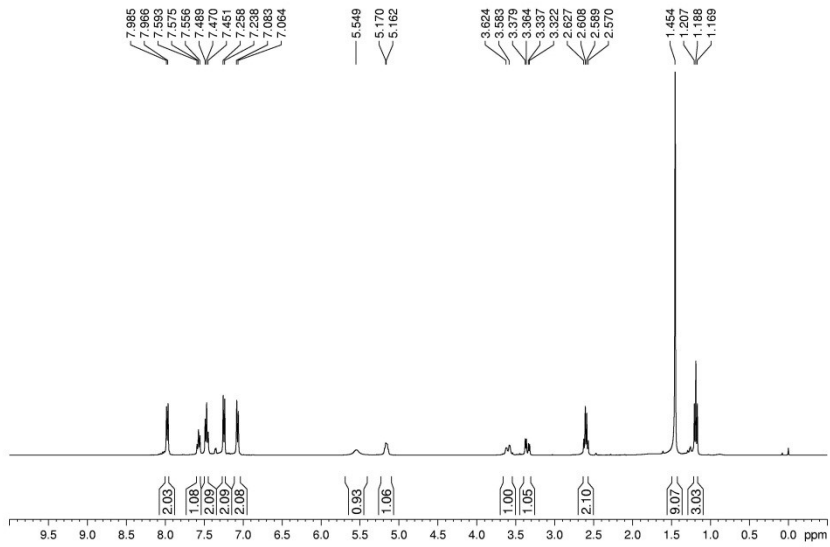
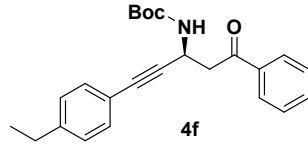
NAME      new4006
EXPNO    1
PROCNO   48
Date_    20200430
Time     14.40 h
INSTRUM  Avance
PROBHD   5mmBBO
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       25000.000 Hz
F2RES    0.762933 Hz
AQ        1.3107700 sec
RG        56.111
WDW       20.000 usec
SS        3.46 usec
TE        294.2 K
D1        1.0000000 sec
D11       0.0300000 sec
D12       0.0300000 sec
D13       0.0300000 sec
D14       0.0300000 sec
D15       0.0300000 sec
D16       0.0300000 sec
D17       0.0300000 sec
D18       0.0300000 sec
D19       0.0300000 sec
D20       0.0300000 sec
D21       0.0300000 sec
D22       0.0300000 sec
D23       0.0300000 sec
D24       0.0300000 sec
D25       0.0300000 sec
D26       0.0300000 sec
D27       0.0300000 sec
D28       0.0300000 sec
D29       0.0300000 sec
D30       0.0300000 sec
D31       0.0300000 sec
D32       0.0300000 sec
D33       0.0300000 sec
D34       0.0300000 sec
D35       0.0300000 sec
D36       0.0300000 sec
D37       0.0300000 sec
D38       0.0300000 sec
D39       0.0300000 sec
D40       0.0300000 sec
D41       0.0300000 sec
D42       0.0300000 sec
D43       0.0300000 sec
D44       0.0300000 sec
D45       0.0300000 sec
D46       0.0300000 sec
D47       0.0300000 sec
D48       0.0300000 sec
D49       0.0300000 sec
D50       0.0300000 sec
D51       0.0300000 sec
D52       0.0300000 sec
D53       0.0300000 sec
D54       0.0300000 sec
D55       0.0300000 sec
D56       0.0300000 sec
D57       0.0300000 sec
D58       0.0300000 sec
D59       0.0300000 sec
D60       0.0300000 sec
D61       0.0300000 sec
D62       0.0300000 sec
D63       0.0300000 sec
D64       0.0300000 sec
D65       0.0300000 sec
D66       0.0300000 sec
D67       0.0300000 sec
D68       0.0300000 sec
D69       0.0300000 sec
D70       0.0300000 sec
D71       0.0300000 sec
D72       0.0300000 sec
D73       0.0300000 sec
D74       0.0300000 sec
D75       0.0300000 sec
D76       0.0300000 sec
D77       0.0300000 sec
D78       0.0300000 sec
D79       0.0300000 sec
D80       0.0300000 sec
D81       0.0300000 sec
D82       0.0300000 sec
D83       0.0300000 sec
D84       0.0300000 sec
D85       0.0300000 sec
D86       0.0300000 sec
D87       0.0300000 sec
D88       0.0300000 sec
D89       0.0300000 sec
D90       0.0300000 sec
D91       0.0300000 sec
D92       0.0300000 sec
D93       0.0300000 sec
D94       0.0300000 sec
D95       0.0300000 sec
D96       0.0300000 sec
D97       0.0300000 sec
D98       0.0300000 sec
D99       0.0300000 sec
D100      0.0300000 sec
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	8.64	19460246	1265912	50.23%	1.227	BB
2	11.33	19285534	1005255	49.77%	1.274	BB

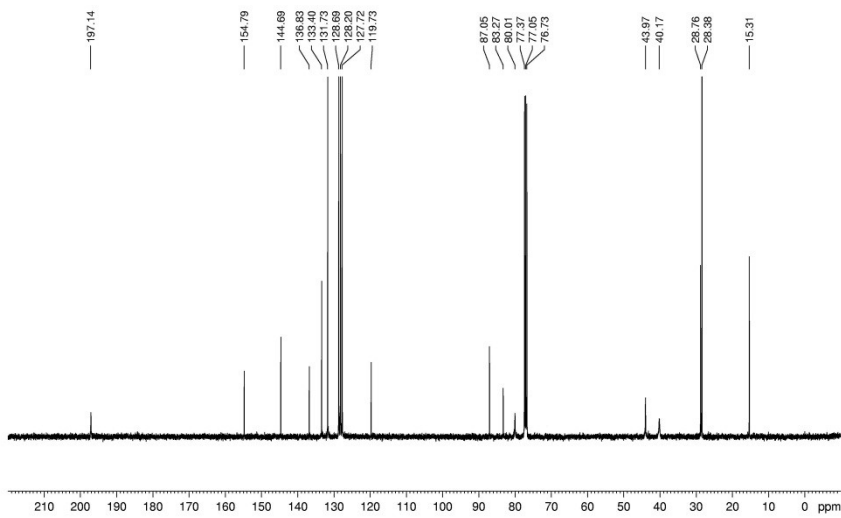


Entry	Retention time	Area	Height	Area%	Width	Type
1	8.82	1244198	87139	8.32	0.564	BB
2	11.57	13714434	712963	91.68%	2.288	BB



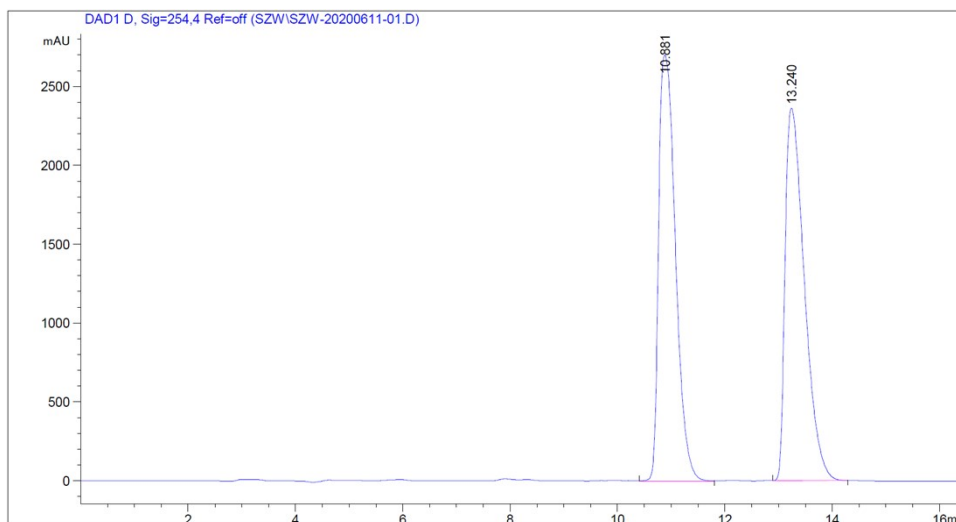
```

NAME          new400f
EXPNO         1
PROCNO        1
Date_         20200311
Time          19.24 h
INSTRUM       spect
PROBHD        2116098_0161 f
PULPROG       zgpg30
TD             65536
SOLVENT       CDCl3
NS             8
DS             0
SWH           3555.558 Hz
F2RES         0.149542 Hz
AQ            3.84e-200 sec
RG            384.25
DM            50.000 usec
DE            7.46 usec
TE            298.2 K
D1            1.00000000 sec
D11           0.00000000 sec
D12           0.00000000 sec
SFO1          400.1301847 MHz
NUC1          13C
PC            3.50 usec
PI            10.50 usec
PT            65536
SF            400.1300104 MHz
WDW           EM
SS            0
LB            0.30 Hz
GB            0
PC            1.00
  
```

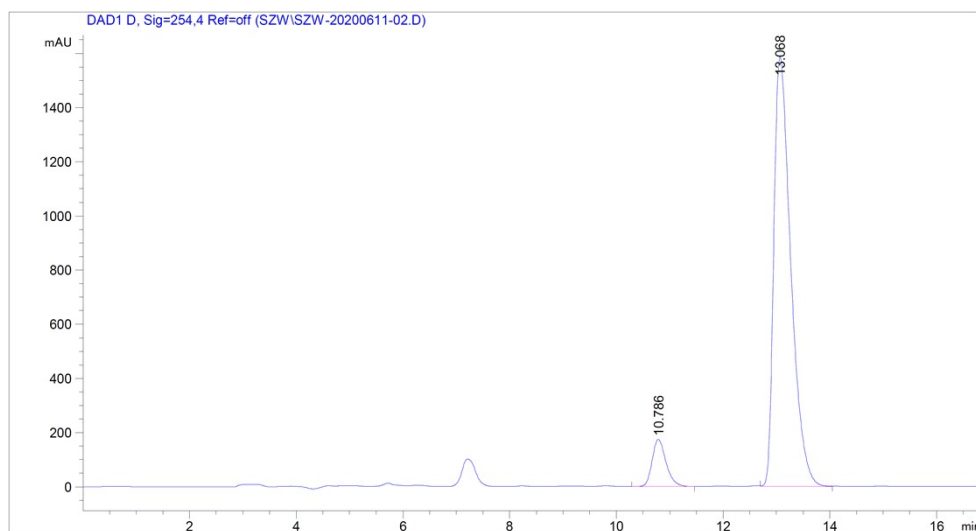


```

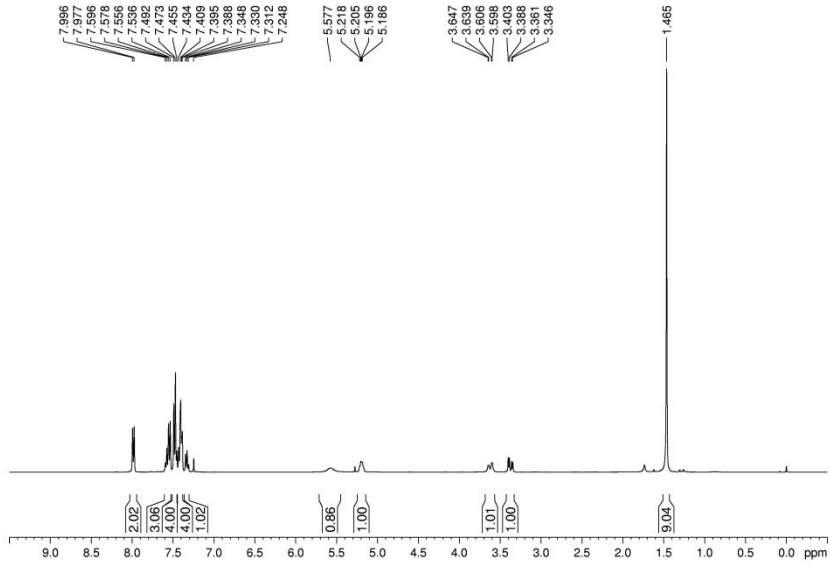
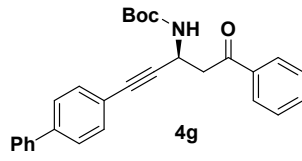
NAME          new400f
EXPNO         1
PROCNO        1
Date_         20200311
Time          19.25 h
INSTRUM       spect
PROBHD        2116098_0161 f
PULPROG       zgpg30
TD             65536
SOLVENT       CDCl3
NS             8
DS             0
SWH           30500.000 Hz
F2RES         0.142970 Hz
AQ            1.101700 sec
RG            28.10
DM            8.00 usec
DE            296.1 K
D1            2.00000000 sec
D11           0.30000000 sec
D12           0.00000000 sec
SFO1          100.6261202 MHz
NUC1          13C
PC            3.50 usec
PI            1.50 usec
PT            65536
SF            100.6261202 MHz
WDW           EM
SS            0
LB            1.00 Hz
GB            0
PC            1.00
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.881	VB	0.3413	5.86226e4	2699.87402	49.9722
2	13.240	VB	0.3858	5.86877e4	2362.28125	50.0278

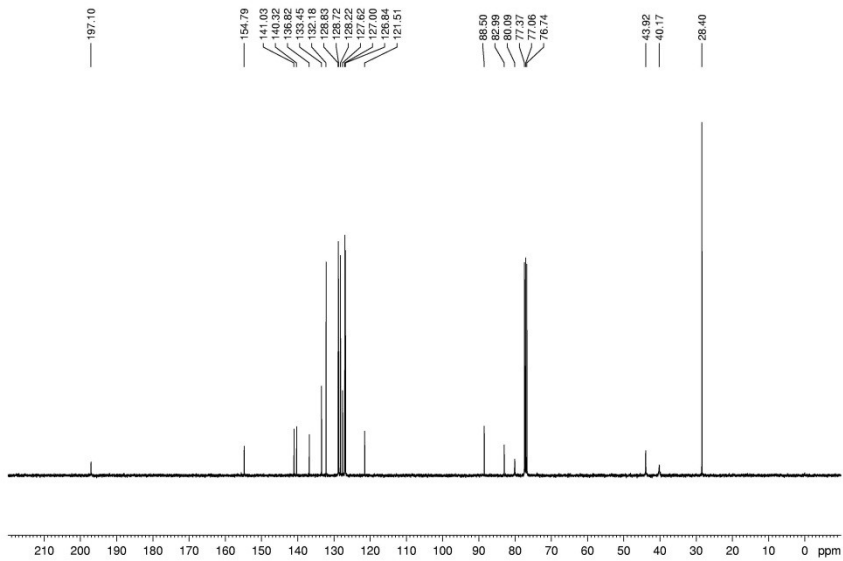


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.786	BB	0.2777	3167.75732	174.56604	8.3047
2	13.068	VB	0.3371	3.49762e4	1587.25708	91.6953



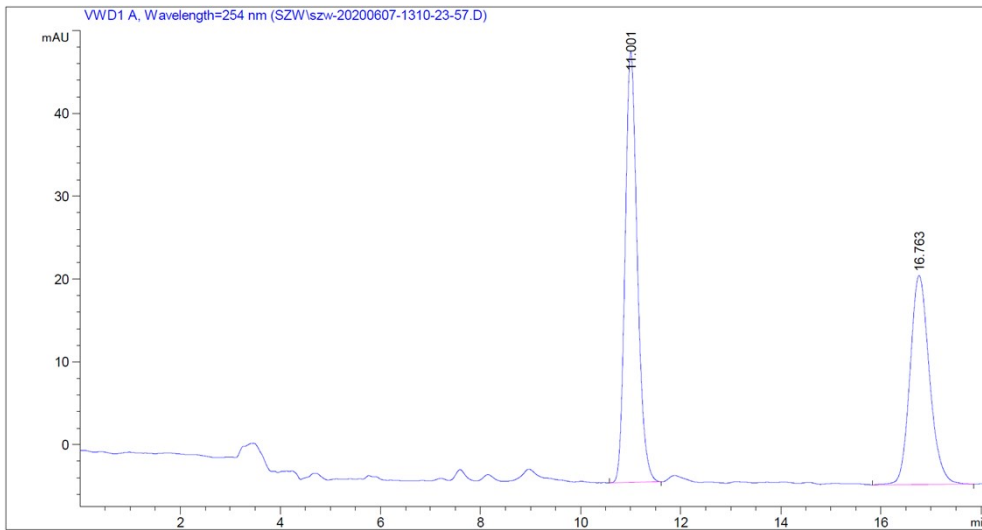
```

NAME      new400M
EXPNO    1
PROCNO   1
Date_    20200524
Time     19.27 h
INSTRUM  Avance
PROBHD   Z116098_0861 (
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SWH      5555.556 Hz
FIDRES   0.169542 Hz
AQ       3.1893362 sec
RG        66.6667
DM       90.000 usec
DE       3.46 usec
TE       296.2 K
D1       1.00000000 sec
TDD      400.1321847 MHz
SFO1     400.1321847 MHz
NUC1     13C
P2       3.50 usec
P1       10.50 usec
SI       65536
SF       400.1300141 MHz
WDM      64
SFR      0
LB       0.30 Hz
GB       0
PC       1.00
  
```

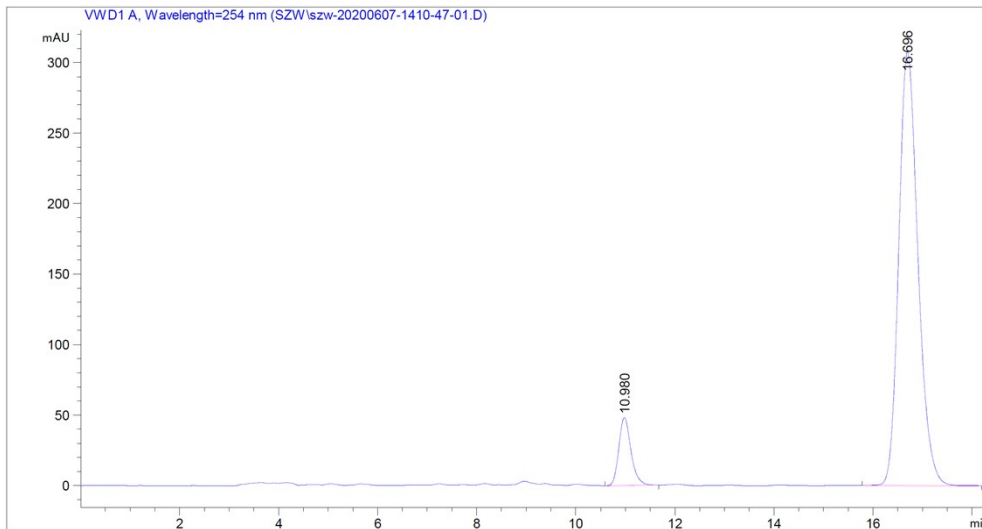


```

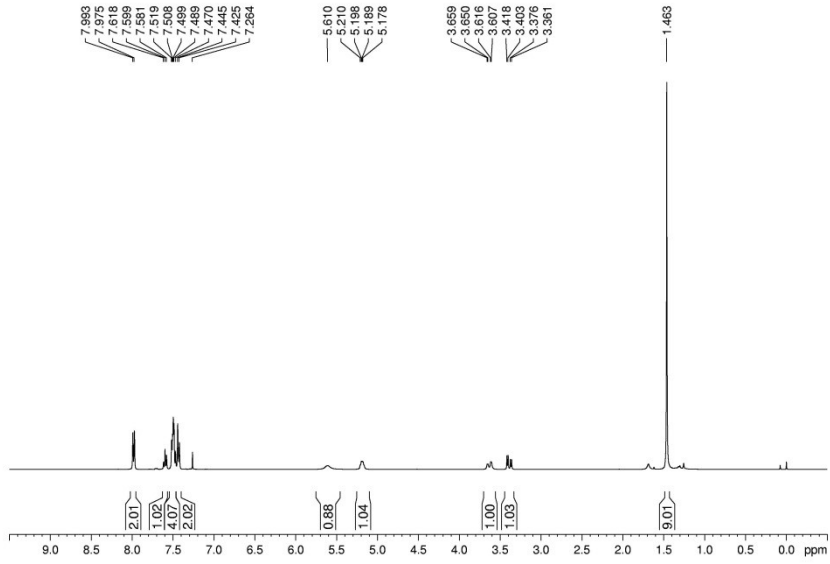
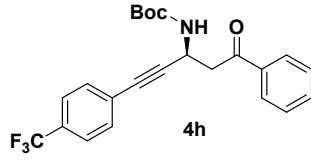
NAME      new400M
EXPNO    1
PROCNO   1
Date_    20200524
Time     19.27 h
INSTRUM  Avance
PROBHD   Z116098_0861 (
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       512
DS       0
SWH      25000.000 Hz
FIDRES   0.161339 Hz
AQ       1.1107700 sec
RG        62.5276
DM       21.000 usec
DE       4.50 usec
TE       299.4 K
D1       2.00000000 sec
D11      0.20000000 sec
TDD      100.6238359 MHz
SFO1     100.6238359 MHz
NUC1     13C
P2       3.11 usec
P1       3.50 usec
SI       32768
SF       100.6127693 MHz
WDM      64
SFR      0
LB       1.00 Hz
GB       0
PC       1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.001	BB	0.2594	880.00592	51.99754	56.3655
2	16.763	BB	0.4137	681.24371	25.25389	43.6345



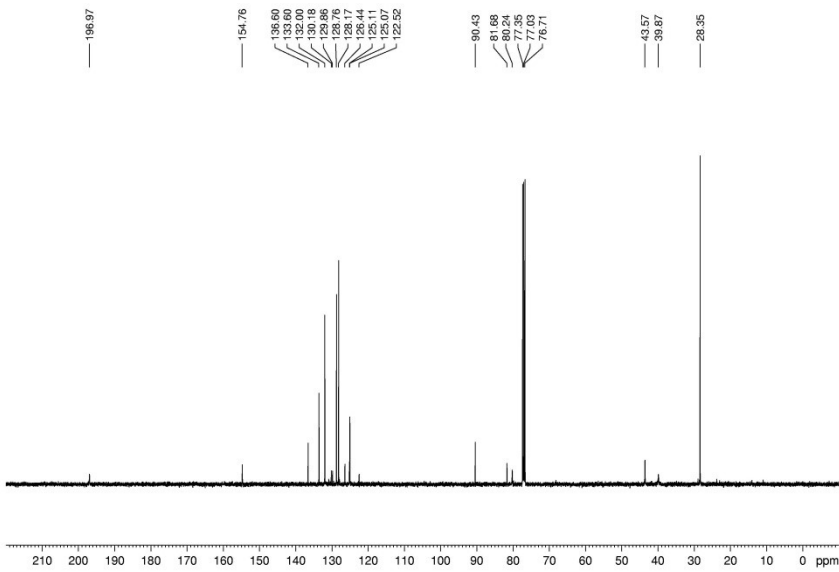
峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.980	BB	0.2615	825.24457	48.25676	9.0594
2	16.696	BB	0.4142	8283.98535	307.57172	90.9406



```

NAME      0144004
EXPNO    216
PROCNO   1
Date_    20210409
Time     22.05
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       0
DS       0
SWH      8012.820 Hz
FIDRES   0.122266 Hz
AQ       4.0899968 sec
RG       55.34
DM       62.400 usec
DE       6.50 usec
TE       295.6 K
D1       3.0000000 sec
TD0      1

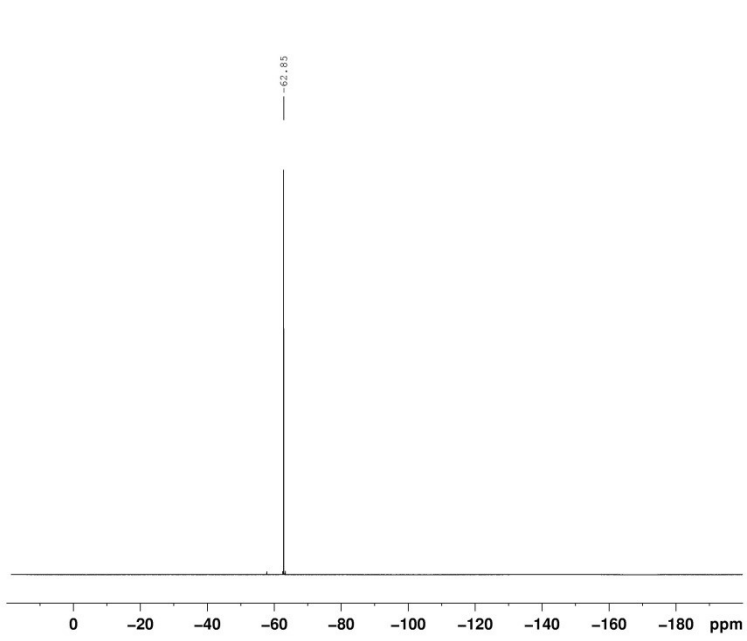
===== CHANNEL f1 =====
SFO1    400.1522008 MHz
NUC1     13C
P1      10.75 usec
e1      65536
SF      400.1500088 MHz
MW      0
SFB     0.30 Hz
GB      0
PC      1.00
  
```



```

NAME      0144004
EXPNO    216
PROCNO   1
Date_    20210409
Time     22.13
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       0
DS       0
SWH      25252.525 Hz
FIDRES   0.381323 Hz
AQ       1.2976620 sec
RG       195.48
DM       19.800 usec
DE       6.50 usec
TE       295.6 K
D1       2.0000000 sec
D11     0.03000000 sec
TD0      1

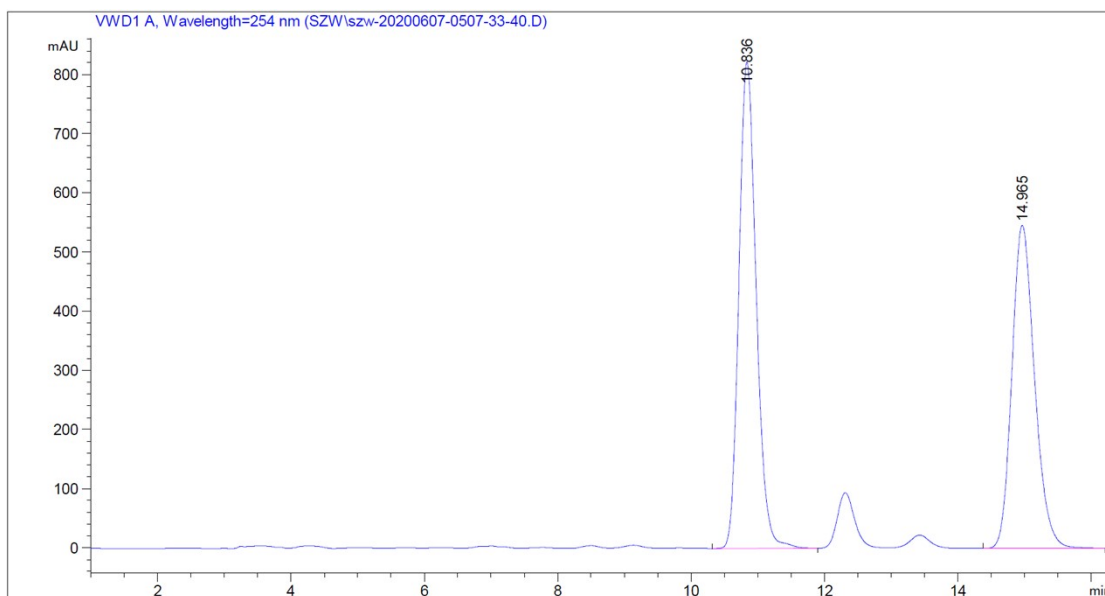
===== CHANNEL f1 =====
SFO1    100.6283620 MHz
NUC1     13C
P1      10.50 usec
e1      65768
SF      100.6177980 MHz
MW      0
SFB     1.00 Hz
GB      0
PC      1.40
  
```

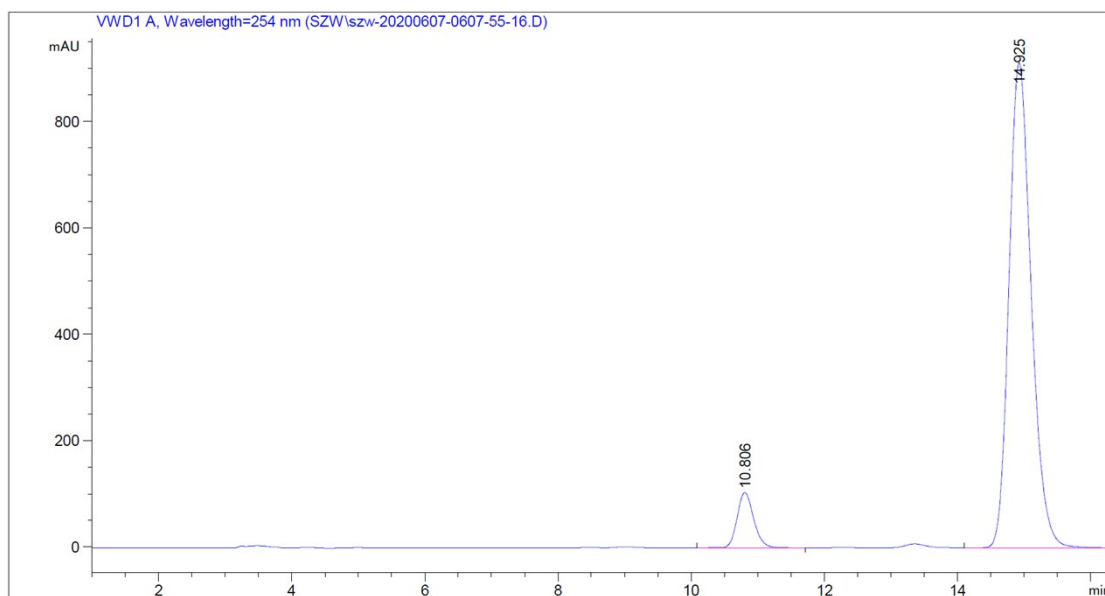
```

NAME          old400M
EXPNO         217
PROCNO        1
Date_         20210409
Time         22.34
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30p2
TD            131072
SOLVENT       CDCl3
NS            16
DS            4
SWH           89285.711 Hz
FIDRES        0.681196 Hz
AQ            0.7340532 sec
RG            195.85
DW            5.600 usec
DE            6.50 usec
TE            299.9 K
D1            1.0000000 sec
D11           0.0300000 sec
D12           0.0002000 sec
TDO           1
----- CHANNEL f1 -----
SFO1          376.4795333 MHz
NUC1          13P
P1            14.00 usec
SI            65936
SF            376.5171850 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

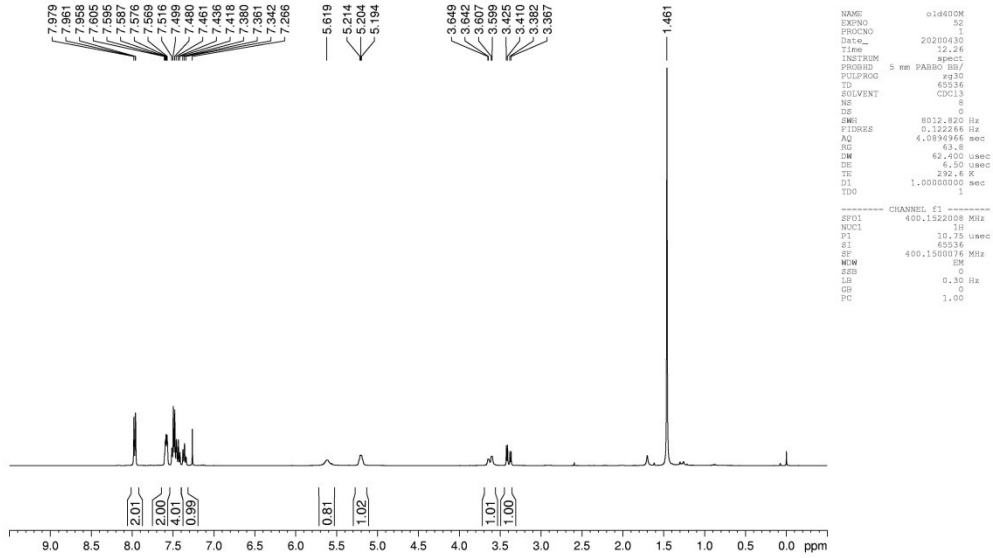
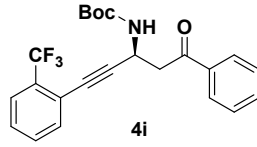
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.836	BV	0.2783	1.48204e4	822.25342	53.5088
2	14.965	BB	0.3621	1.28767e4	546.00385	46.4912



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.806	BB	0.2654	1798.15100	104.17737	7.8512
2	14.925	BB	0.3559	2.11046e4	912.31665	92.1488

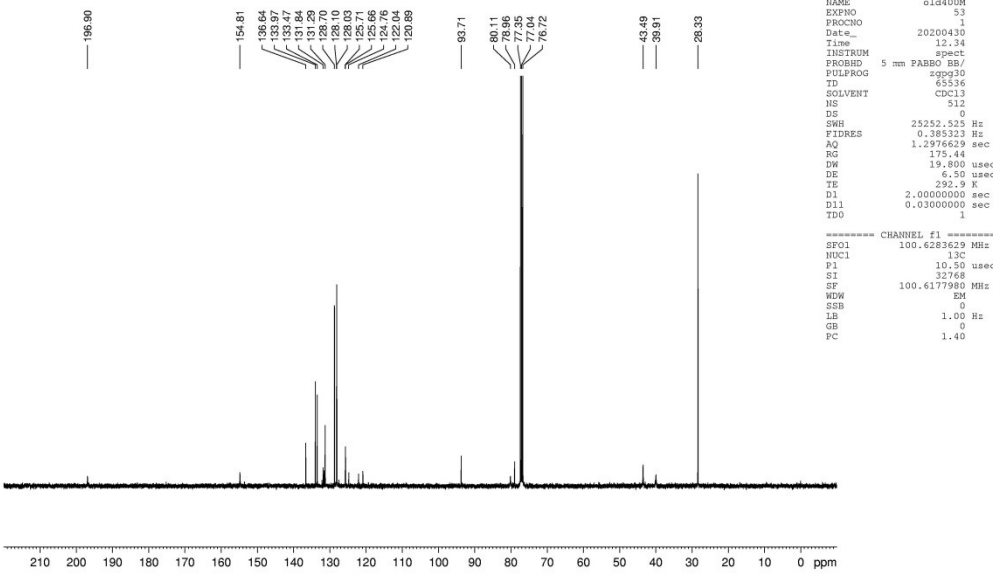


```

NAME      o1d400M
EXPNO    32
PROCNO   1
Date_    20200430
Time     12.26
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       3
DS       0
SWH      8012.820 Hz
FIDRES   0.122268 Hz
AQ       4.0894366 sec
RG       63.6
DM       62.490 usec
DE       6.50 usec
TE       292.2 K
D1       1.0000000 sec
TDO      1
  
```

```

===== CHANNEL f1 =====
SFO1    400.1522008 MHz
NUC1    13
P1      10.75 usec
SI      65536
SF      400.1500076 MHz
WDW     EM
SSB     0
LB      0.10 Hz
GB      0
PC      1.00
  
```

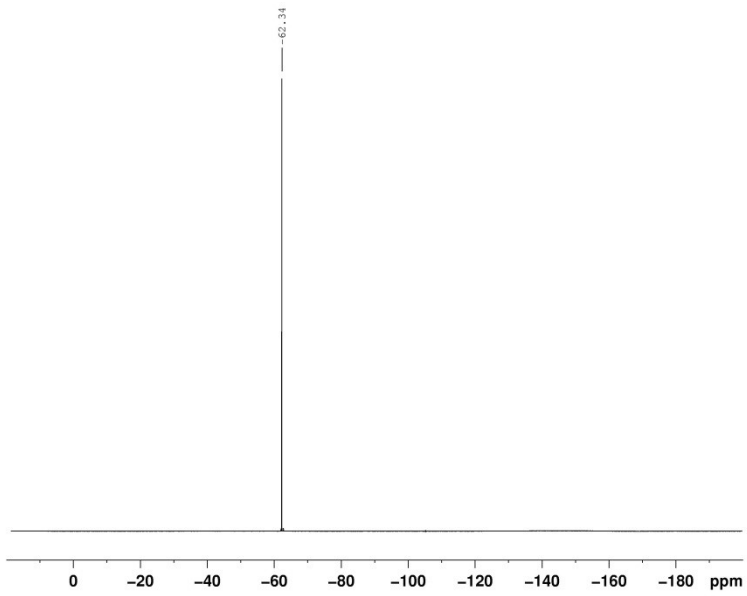


```

NAME      o1d400M
EXPNO    53
PROCNO   1
Date_    20200430
Time     12.34
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       3
DS       0
SWH      23252.525 Hz
FIDRES   0.385323 Hz
AQ       1.2976629 sec
RG       175.44
DM       19.800 usec
DE       6.50 usec
TE       292.9 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      1
  
```

```

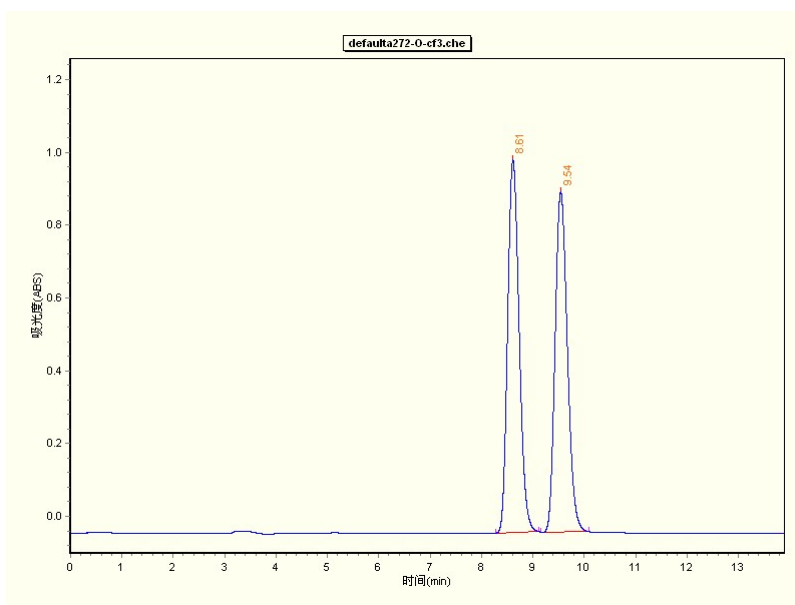
===== CHANNEL f1 =====
SFO1    100.6283629 MHz
NUC1    13C
P1      10.50 usec
SI      32768
SF      100.6177980 MHz
WDW     EM
SSB     0
LB      1.00 Hz
GB      0
PC      1.40
  
```



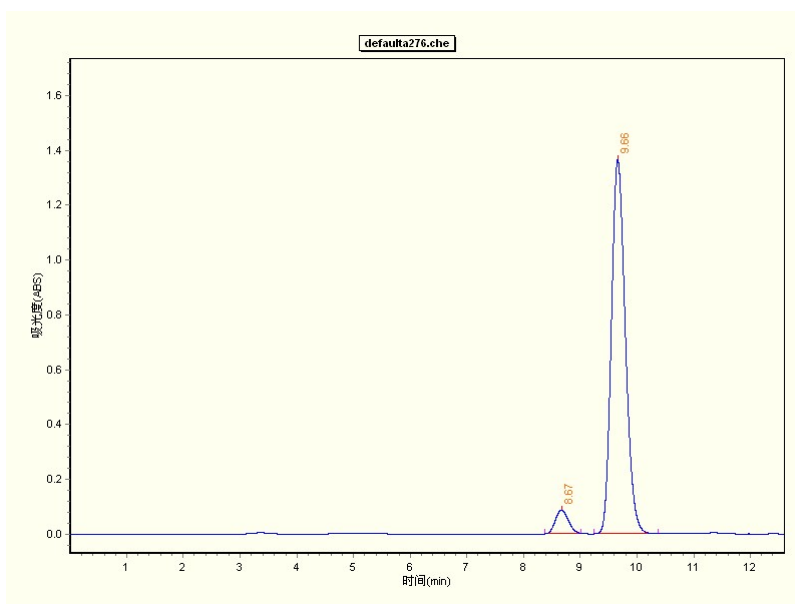
```

NAME          old400M
EXPNO         1
PROCNO        1
Date_         20200430
Time          12.58
INSTRUM       spect
PROBHD        5 mm F4BBO BB/
PULPROG       zgpg30ppm.2
TD            131072
SOLVENT       CDCl3
NS            16
DS            4
SWH           89285.711 Hz
FIDRES        0.681196 Hz
AQ            0.7340532 sec
RG            139.63
DW            5.600 usec
DE            6.50 usec
TE            293.1 K
D1            1.00000000 sec
D11           0.33000000 sec
D12           0.00020000 sec
TD0           1
----- CHANNEL f1 -----
SFO1          376.4795333 MHz
NUC1          13F
P1            14.00 usec
SI            65336
SF            376.5171850 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

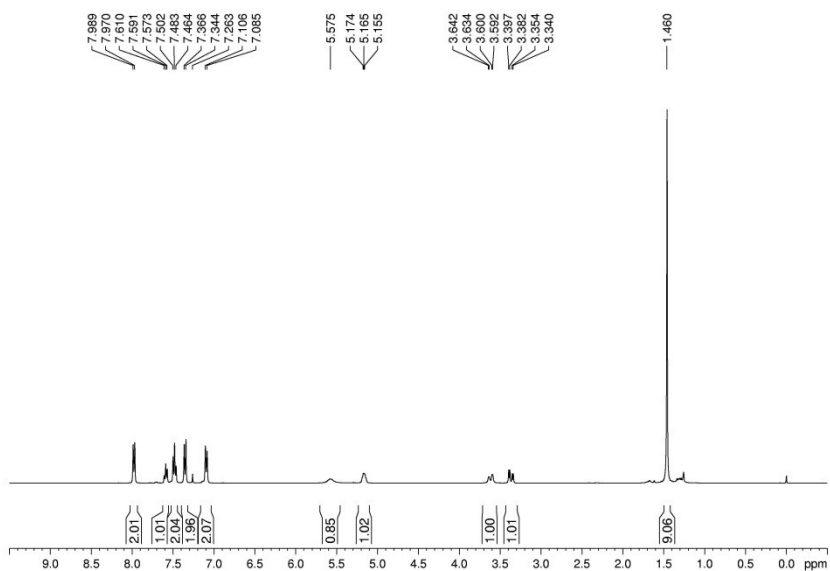
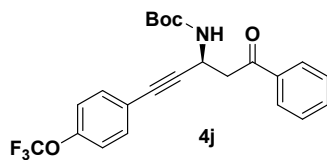
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	8.61	7924886	511619	50.62%	0.843	BB
2	9.54	7730964	467297	49.38%	0.940	BB

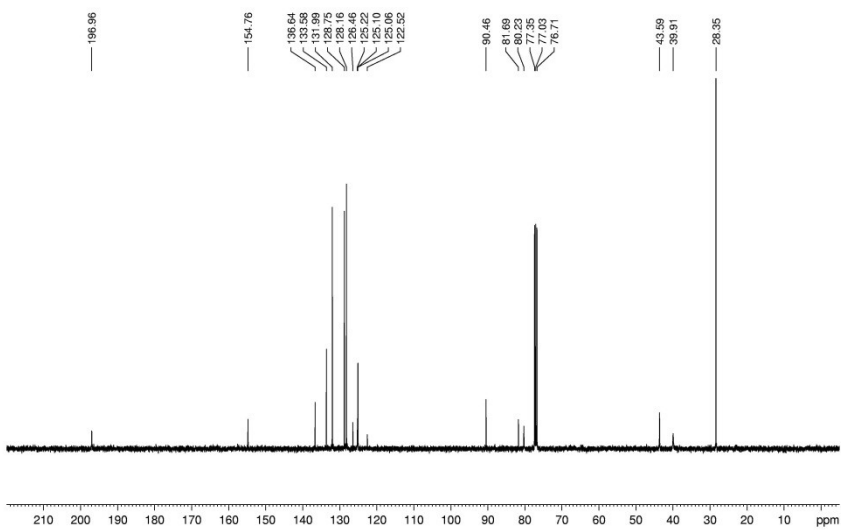


Entry	Retention time	Area	Height	Area%	Width	Type
1	8.67	676746	42977	5.48%	0.648	BB
2	9.66	11676561	682582	94.52%	1.135	BB



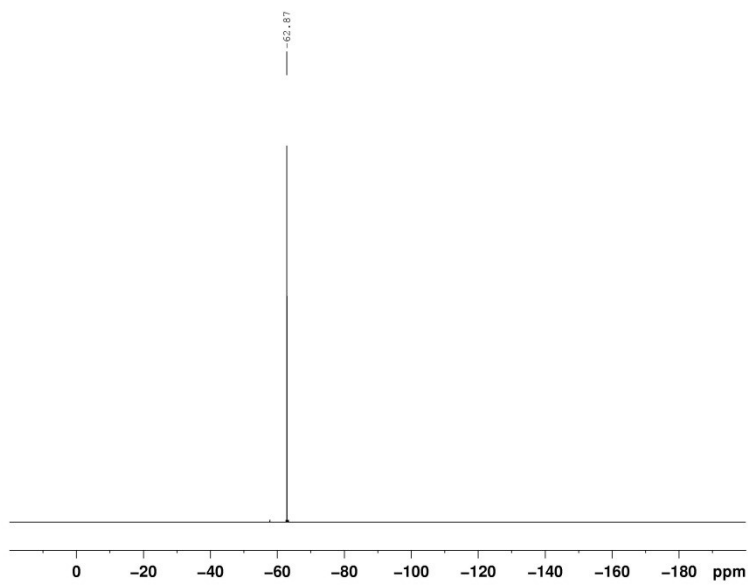
```

NAME      new400M
EXPNO    1
PROCNO   1
Date_    20200511
Time     17.07 h
INSTRUM  spect
PROBHD   5mm QNP1H
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        5
DS        4
F2H1     5555.556 Hz
F2H2     5.162942 Hz
AQ       3.4983202 sec
RG        101
DM       90.0000000 sec
DE       3.44 usec
TE       298.15 K
D1       1.000000000 sec
D11      0
D12      0
SFO1     400.1321847 MHz
NUC1     13C
PD       3.50 usec
PI       10.50 usec
PT       65536
RF       400.1320082 MHz
MEW      0
SES      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



```

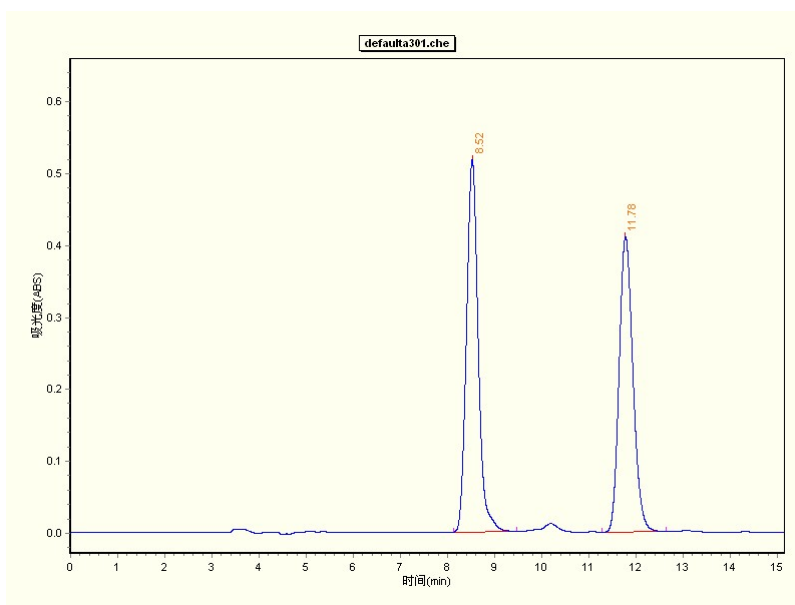
NAME      new400M
EXPNO    1
PROCNO   1
Date_    20200524
Time     12.44 h
INSTRUM  spect
PROBHD   5mm QNP13
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        5
DS        4
F2H1     25000.000 Hz
F2H2     0.142489 Hz
AQ       1.3107750 sec
RG        62.0216
DM       20.0000000 sec
DE       6.40 usec
TE       299.0 K
D1       2.000000000 sec
D11      0.030000000 sec
D12      0
SFO1     100.6218059 MHz
NUC1     13C
PD       3.13 usec
PI       9.20 usec
PT       65536
RF       100.6127485 MHz
MEW      0
SES      0
LB       1.40 Hz
GB       0
PC       1.40
  
```



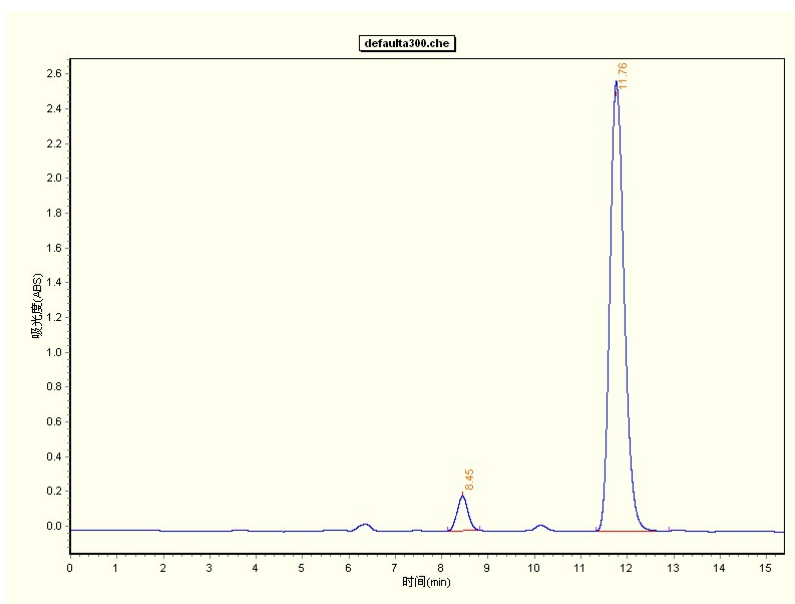
```

NAME          new100M
EXPNO         64
PROCNO        1
DELTA         20200524
Time         12.45 h
INSTRUM       Avance
PROBHD        2116098.0851 Q
PULPROG       zgpg30
TD            131072
SOLVENT       CDCl3
NS            16
DS            4
SWH           90809.098 Hz
FIDRES        1.387163 Hz
AQ            0.7209460 sec
RG            101
DKW           5.500 usec
DE           6.500 usec
TE            298.2 K
D1            1.00000000 sec
D11           0.03000000 sec
TD0           1
SFO1          376.4607164 MHz
NUC1          19F
P1            18.000 usec
SI            65536
SF            376.4903662 MHz
KCNW          EM
ZS0           0
LA            0.30 Hz
GB            0
PC            1.00

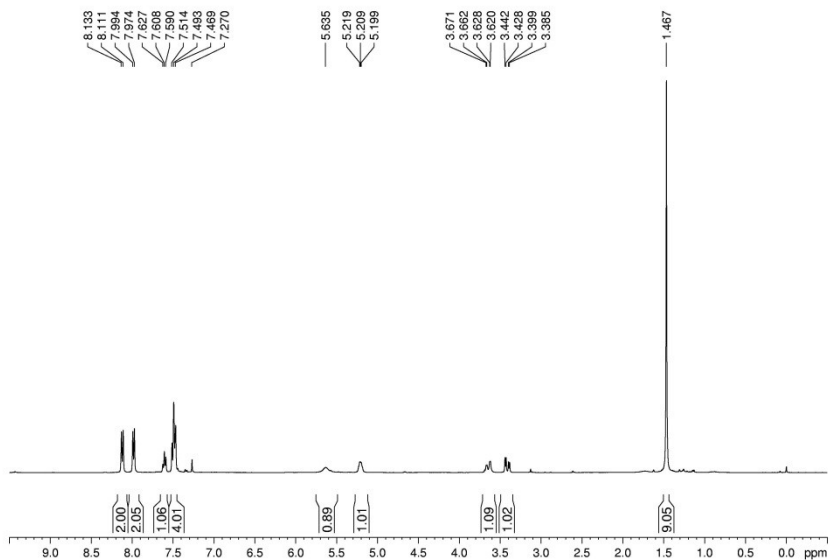
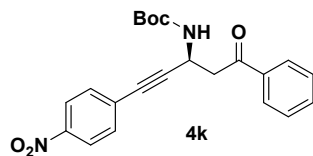
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	8.52	4473774	258716	51.70%	1.333	BB
2	11.78	4180266	205493	48.30	1.369	BB

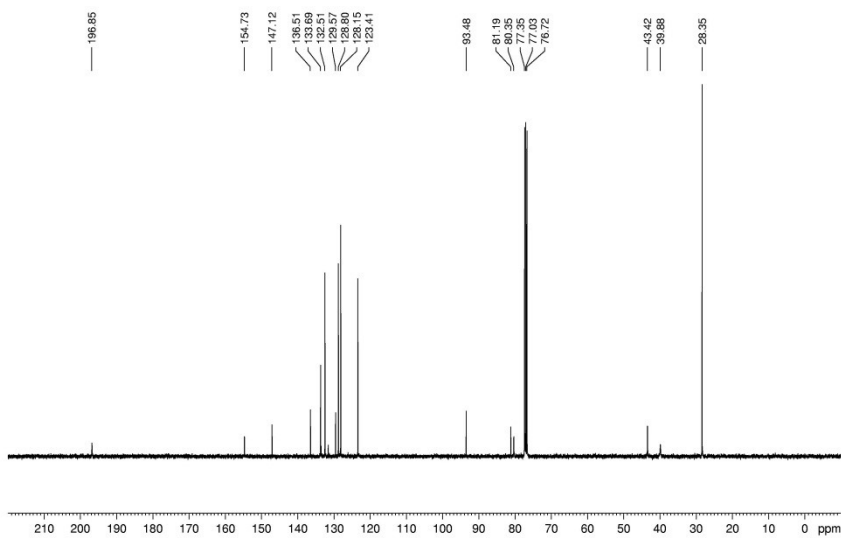


Entry	Retention time	Area	Height	Area%	Width	Type
1	8.45	1610386	99130	5.52%	0.695	BB
2	11.76	27584336	1294052	94.48%	1.573	BB



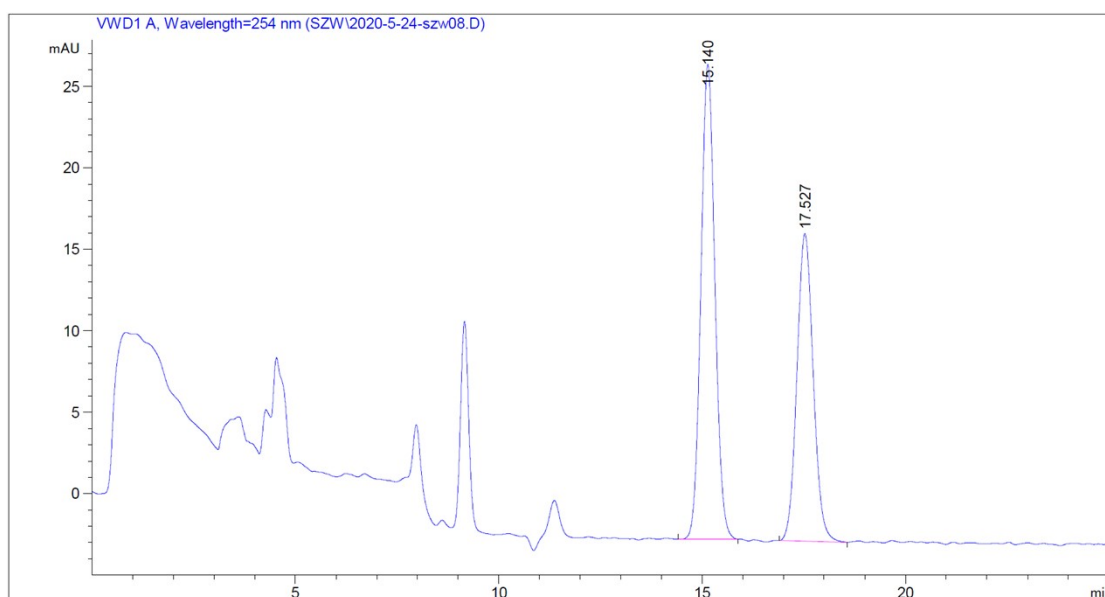
```

NAME      new400M
EXPNO    51
PROCNO   2020510
Date_    13.10 h
INSTRUM  Avance
PROBHD   5mm QNP
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        0
DS        0
SWH       5555.556 Hz
FIDRES    0.164950 Hz
AQ         1.01
RG         5.8982902 sec
CW         95.000 usec
DE         9.46 usec
TE         298.2 K
D1         1.0000000 sec
D11        0.0300000 sec
TDE        0
SFO1      400.1321841 MHz
NUC1      13C
PD         1.00 usec
PT         11.50 usec
SI         65536
SF         400.1300055 MHz
RG         0
WDM        0
SR         0
LB         0.30 Hz
GB         0
PC         1.00
  
```

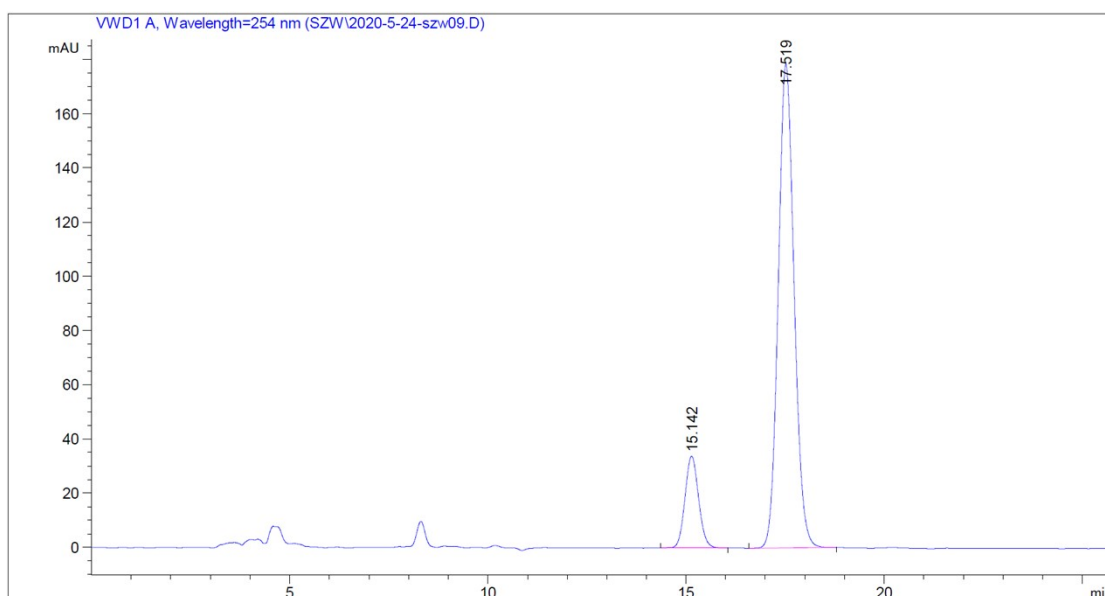


```

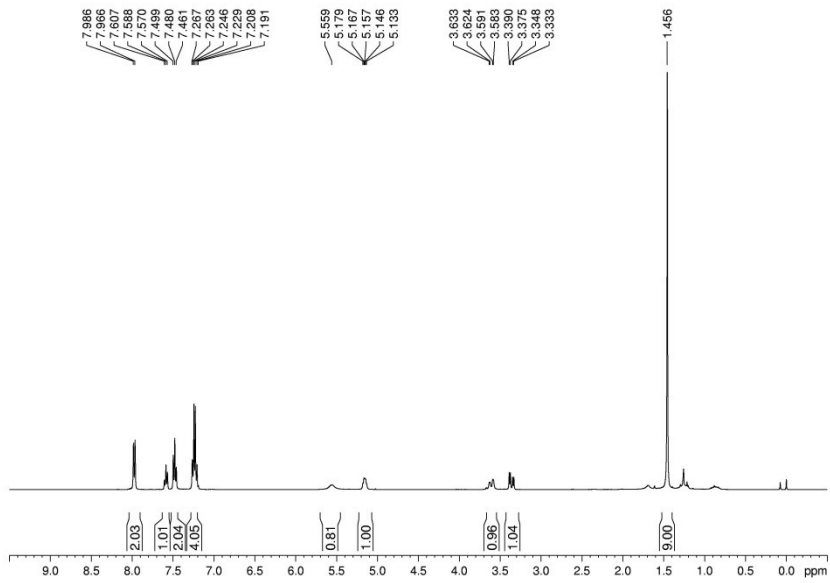
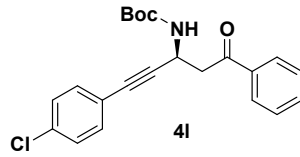
NAME      new400M
EXPNO    55
PROCNO   2020510
Date_    13.10 h
INSTRUM  Avance
PROBHD   5mm QNP
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        0
DS        0
SWH       25000.000 Hz
FIDRES    0.762930 Hz
AQ         1.3107700 sec
RG         57.2562
CW         20.000 usec
DE         6.20 usec
TE         299.2 K
D1         2.0000000 sec
D11        0.0300000 sec
TDE        0
SFO1      100.6238359 MHz
NUC1      13C
PD         3.17 usec
PT         9.50 usec
SI         32768
SF         100.6127685 MHz
RG         0
WDM        0
SR         0
LB         1.00 Hz
GB         0
PC         1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	15.140	BB	0.3694	695.74738	29.15306	56.8133
2	17.527	BB	0.4356	528.87323	18.89400	43.1867

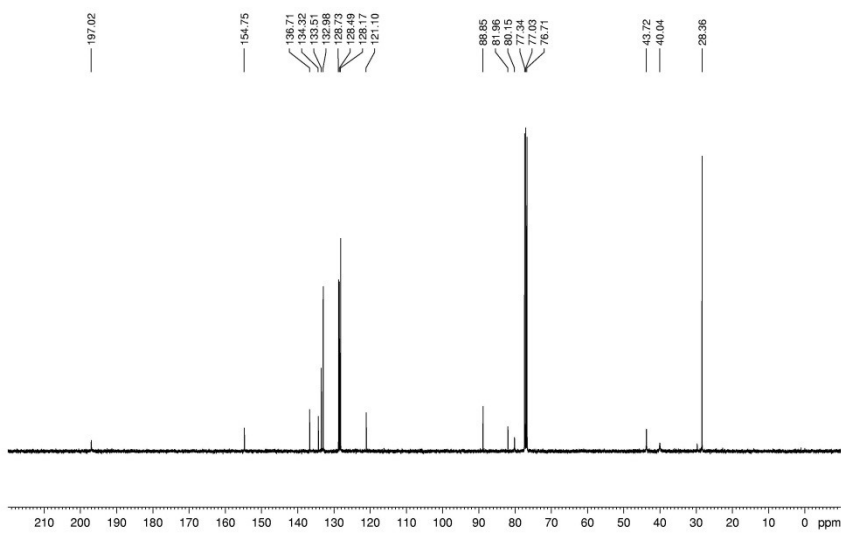


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	15.142	BB	0.3672	804.69385	33.87172	13.9702
2	17.519	BB	0.4278	4955.37646	178.53883	86.0298



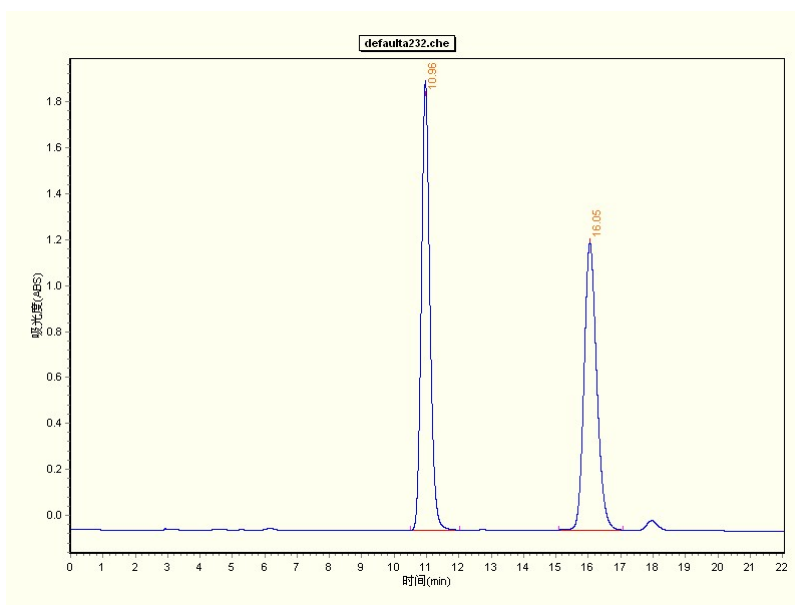
```

NAME      new1004
EXPNO     29
PROCNO    1
Date_     20200410
Time      11.49
INSTRUM   Avance
PROBHD    2114098_0861
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        5555.556 Hz
FIDRES     0.163942 Hz
AQ         5.8982302 sec
RG         101
DM         99.000 usec
DE         3.45 usec
TE         298.2 K
D1         1.0000000 sec
TDO        0
SFO1      400.1321843 MHz
NUC1       1H
PQ         1.25 usec
P1         10.50 usec
PT         65536
SF         400.130082 MHz
WDW        EM
SSB        0
LB         0.35 Hz
GB         0
PC         1.00
  
```

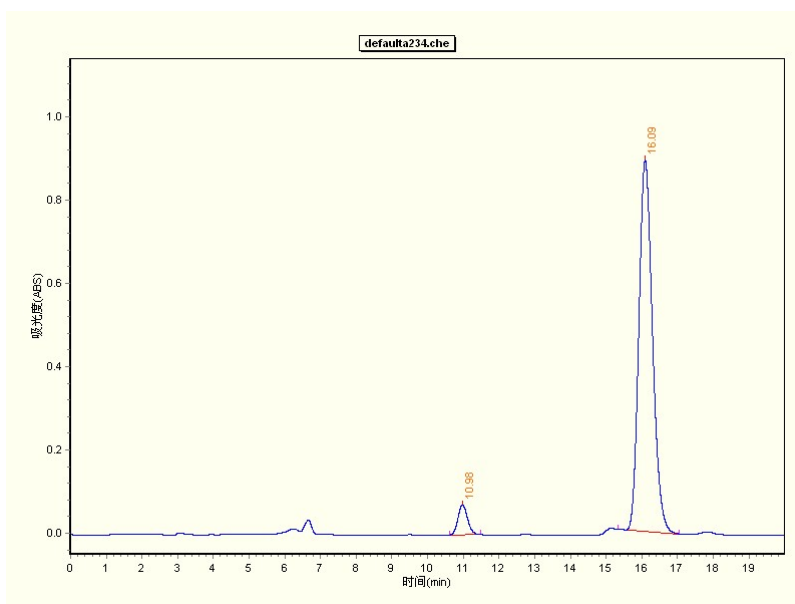


```

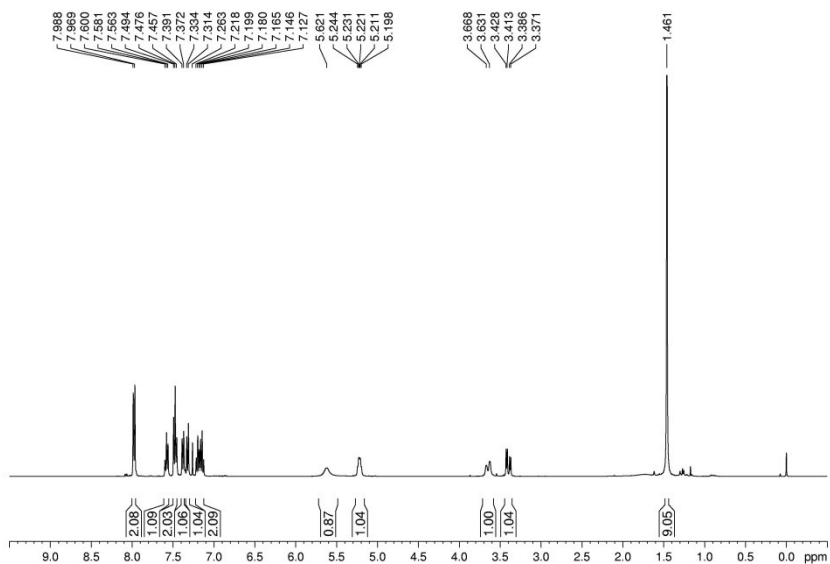
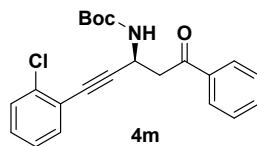
NAME      new1004
EXPNO     30
PROCNO    1
Date_     20200410
Time      14.18
INSTRUM   Avance
PROBHD    2114098_0861
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        25000.000 Hz
FIDRES     0.762929 Hz
AQ         1.310700 sec
RG         101
DM         20.000 usec
DE         6.50 usec
TE         298.2 K
D1         2.0000000 sec
D11        0.2000000 sec
TDO        1
SFO1      100.628359 MHz
NUC1       13C
PQ         3.17 usec
P1         3.50 usec
PT         65768
SF         100.6127685 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	10.96	17829696	977108	51.20%	1.522	BB
2	16.05	16994898	625231	48.80%	1.989	BB

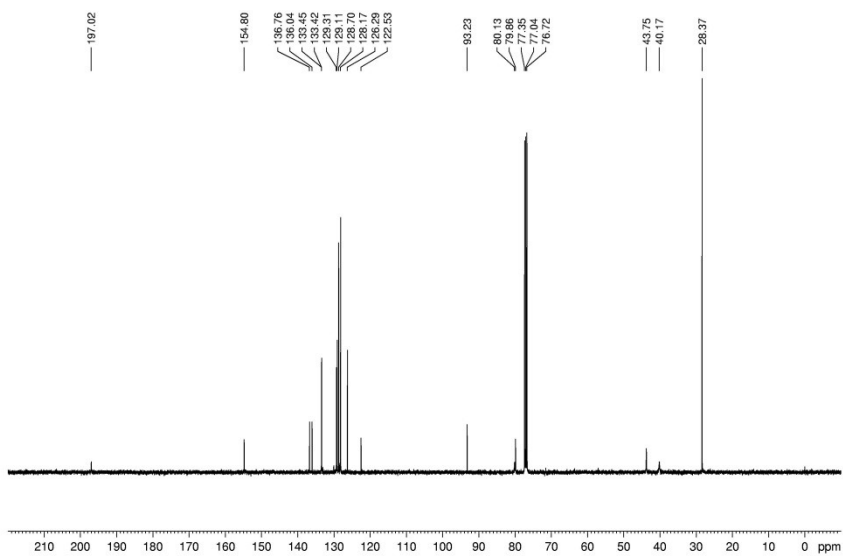


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.98	667477	35980	5.37%	0.880	BB
2	16.09	11753498	445496	94.63%	1.712	BB



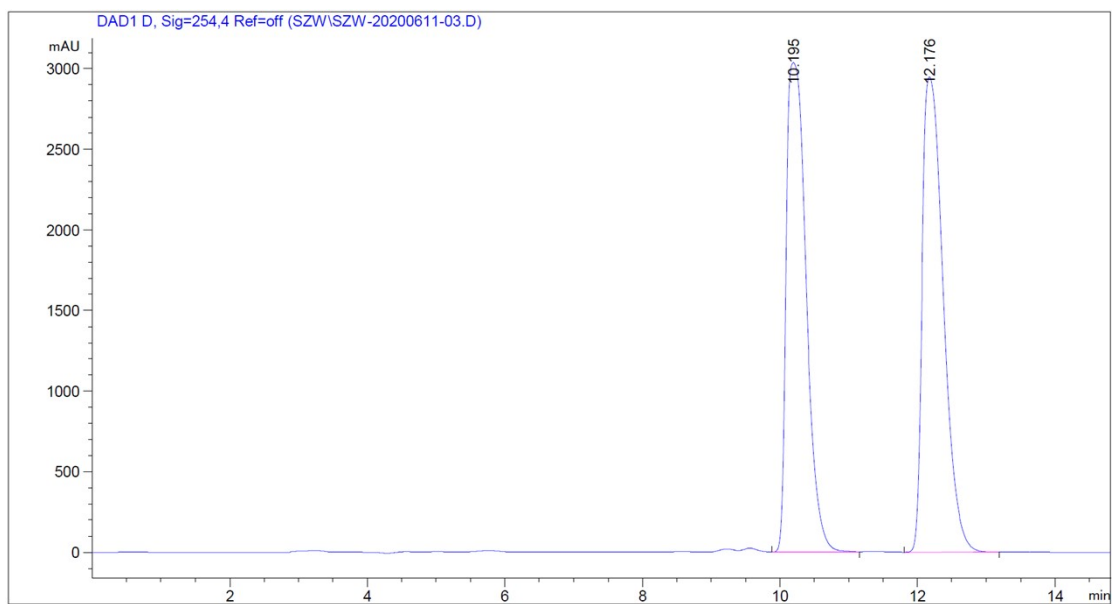
```

NAME      new400M
EXPNO     1
PROCNO    1
Date_     20200531
Time      20.34 h
INSTRUM   Avance
PROBHD    z116098_0861 f
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        5555.556 Hz
F2USER     0.149542 Hz
AQ         5.8982202 sec
RG         321
AQ         30.000 usec
DE         9.44 usec
TE         296.3 K
D1         1.00000000 sec
D11        1
D12        1
D13        400.1321847 MHz
NUC1       13
NUC2       13
PC         3.10 usec
PI         10.10 usec
P1         65.36
P2         400.1300000 MHz
PC         0
SCB        0
SB         0
GB         0
PC         1.00
  
```

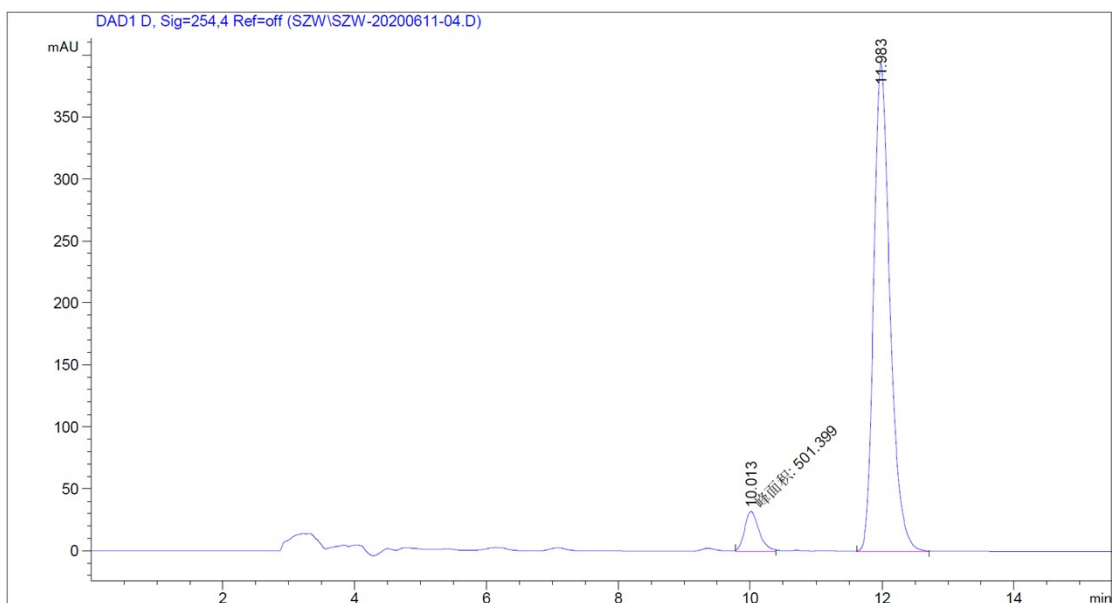


```

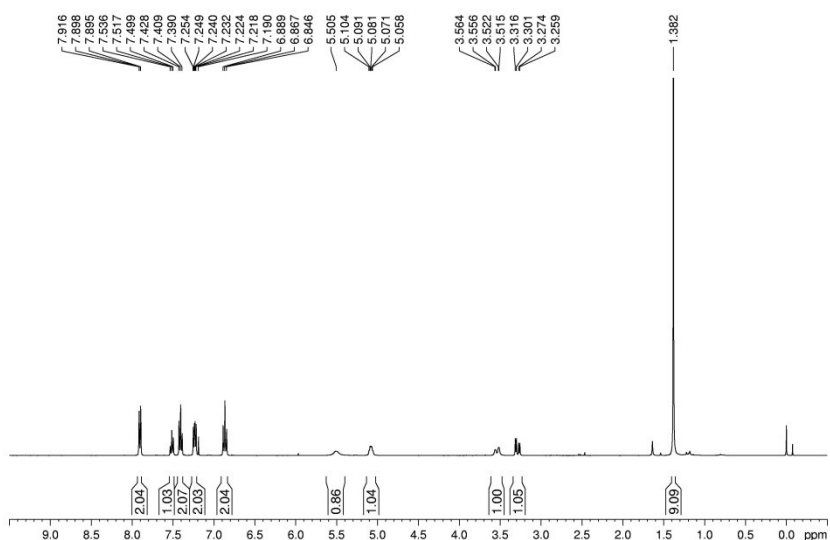
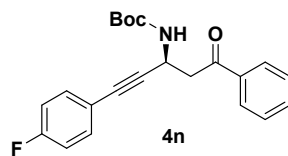
NAME      new400M
EXPNO     1
PROCNO    1
Date_     20200531
Time      21.03 h
INSTRUM   Avance
PROBHD    z116098_0861 f
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        25600.000 Hz
F2USER     0.142839 Hz
AQ         1.3107200 sec
RG         321
AQ         20.000 usec
DE         6.50 usec
TE         296.7 K
D1         2.00000000 sec
D11        0.03000000 sec
D12        1
D13        100.6238259 MHz
NUC1       13
NUC2       13
PC         3.10 usec
PI         9.50 usec
P1         22.68
P2         100.6127483 MHz
PC         0
SCB        0
SB         0
GB         0
PC         1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.195	VV	0.3151	6.06714e4	3036.23218	49.2361
2	12.176	VB	0.3316	6.25539e4	2948.00806	50.7639

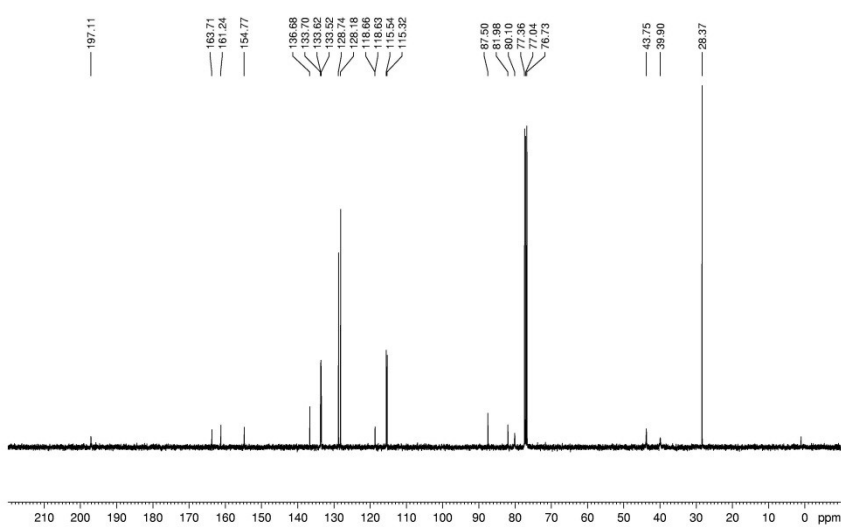


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.013	MM	0.2571	501.39938	32.50312	6.9216
2	11.983	BB	0.2618	6742.58398	393.79138	93.0784



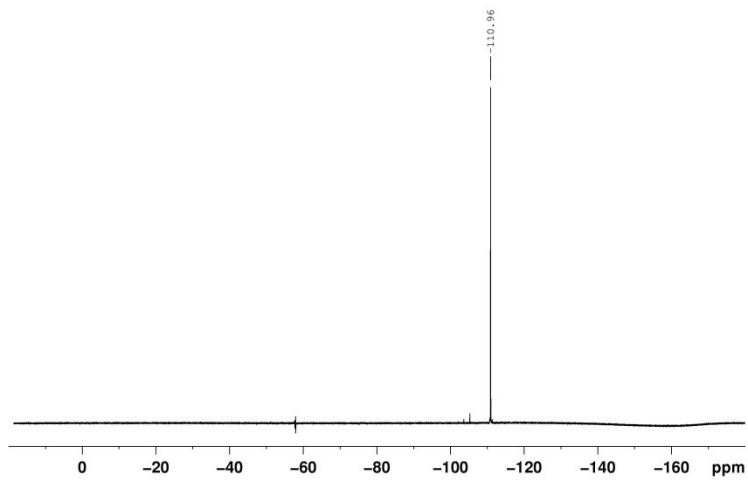
```

NAME      0144006
EXPNO    63
PROCNO   1
Date_    20200430
Time     14.59
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       8012.620 Hz
F2       0.122269 Hz
AQ        4.089496E sec
RG        58.33
DW        62.400 usec
DE        6.50 usec
TE        293.2 K
D1        1.00000000 sec
TD0
===== CHANNEL f1 =====
SFO1     400.1522008 MHz
NUC1      1H
P1        10.75 usec
SFO2     65536
SF        400.1500374 MHz
WCH       68
SGB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```



```

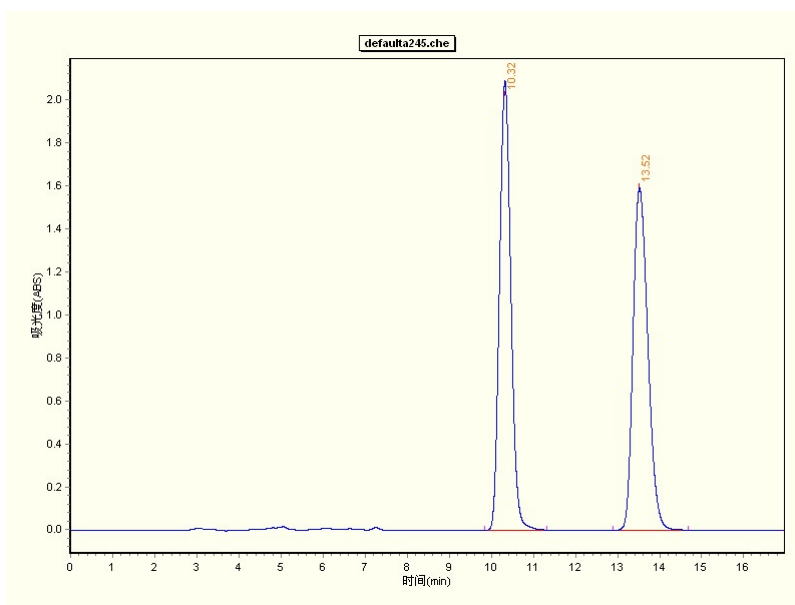
NAME      0144006
EXPNO    64
PROCNO   1
Date_    20200430
Time     15.10
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       25252.520 Hz
F2       0.265320 Hz
AQ        1.8994629 sec
RG        195.45
DW        19.850 usec
DE        6.50 usec
TE        293.4 K
D1        2.00000000 sec
D11       0.03000000 sec
TD0
===== CHANNEL f1 =====
SFO1     100.6283622 MHz
NUC1      13C
P1        12.00 usec
SFO2     32768
SF        100.6177889 MHz
WCH       70
SGB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



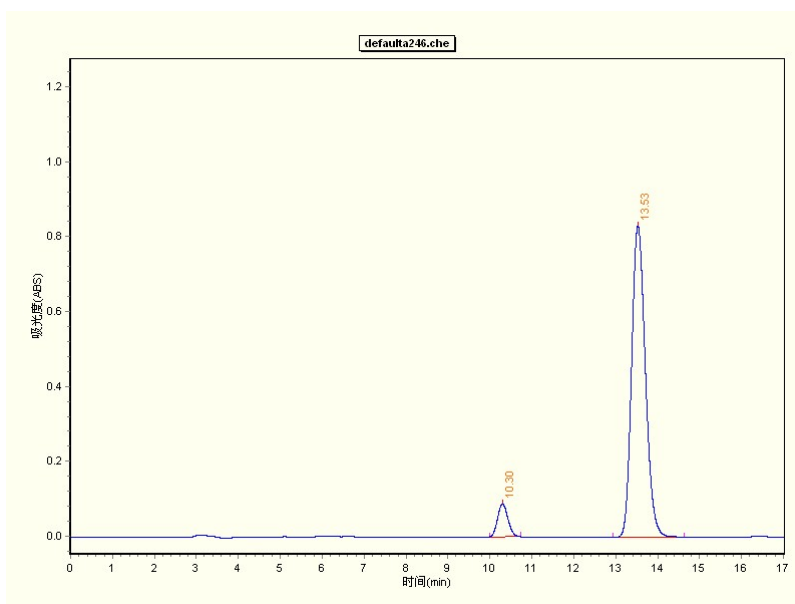
```

NAME          o1d4GDM
EXPNO         40
PROCNO        1
DATE_         20200403
Time         15.14
INSTRUM       spect
PROBHD        5 mm PABBO NB/
PULPROG       zgpg30
TD            131072
SOLVENT       CDCl3
NS            16
DS            4
SMH           89285.711 Hz
FIDRES        0.861196 Hz
AQ            0.734032 sec
RG            195.85
DM            5.490 usec
DE            6.50 usec
TE            299.3 K
D1            1.0000000 sec
d11           0.1200000 sec
D12           0.0002000 sec
TD0           1
----- CHANNEL f1 -----
SFO1          376.4795333 MHz
NUC1          13C
P1            14.00 usec
SI            65536
SF            376.5171850 MHz
MHZ           2M
SFO           0
LB            0.30 Hz
GB            0
PC            1.00

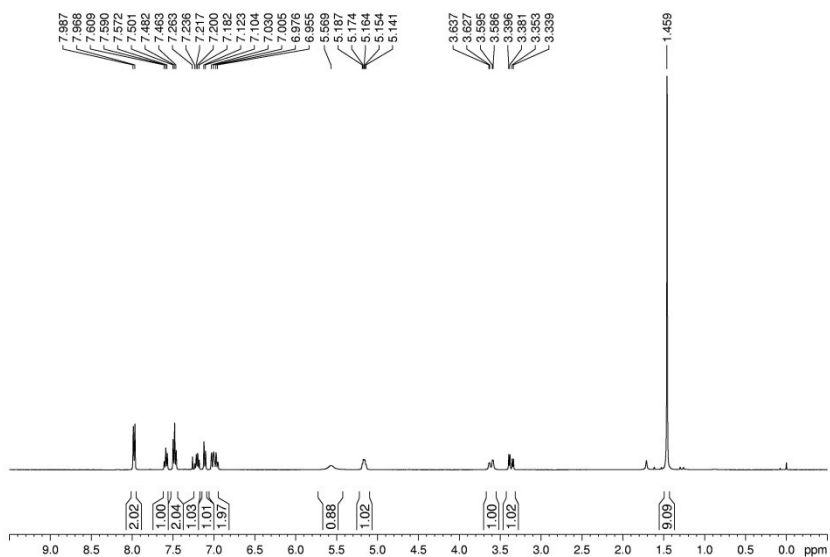
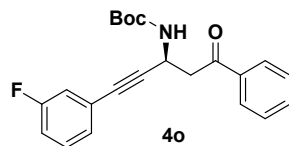
```

Entry	Retention time	Area	Height	Area%	Width	Type
1	10.32	19563835	1043746	50.17%	1.473	BB
2	13.52	19430599	794469	49.83%	1.796	BB

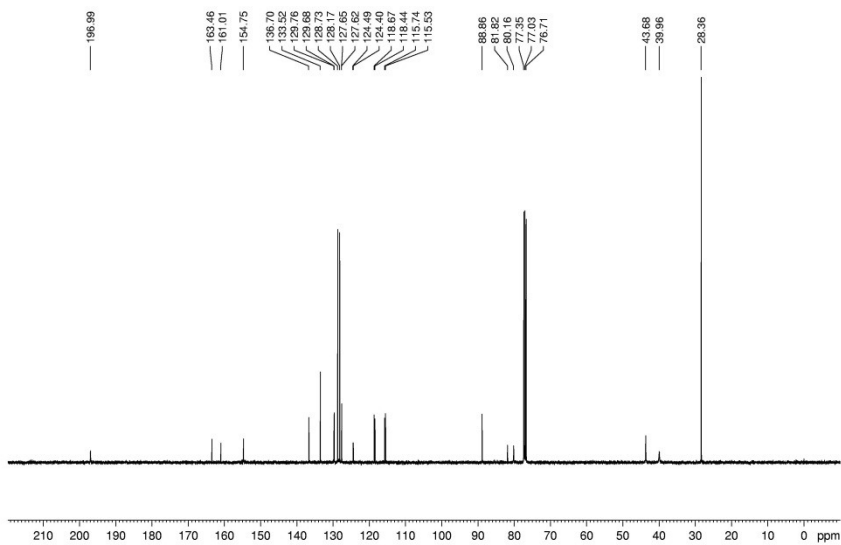


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.30	748772	44044	7.35	0.729	BB
2	13.53	9434591	415488	92.65	1.700	BB



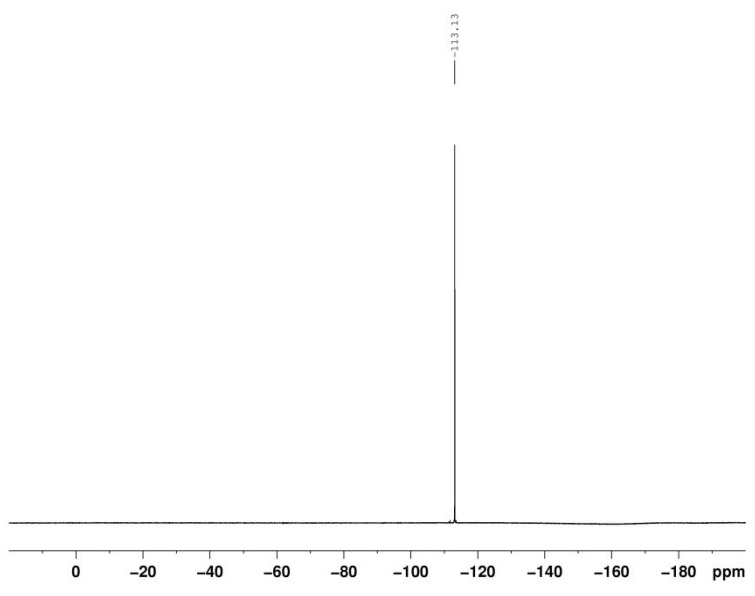
```

NAME      new100M
EXPNO    1
PROCNO   1
Date_    20200524
Time     11:32 h
INSTRUM  Avance
PROBHD   116098_041 4
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SWH      555.546 Hz
F2DRSB   0.149942 Hz
AQ       5.994393 sec
RG       101
LW       90.000 usec
DE       9.46 usec
TE       299.3 K
D1       1.0000000 sec
TD0      1
SFO1     400.1321847 MHz
NUC1     13C
PC       3.50 usec
SI       31.50 usec
SF       65536
SR       400.1330082 MHz
WDM      SM
SFB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



```

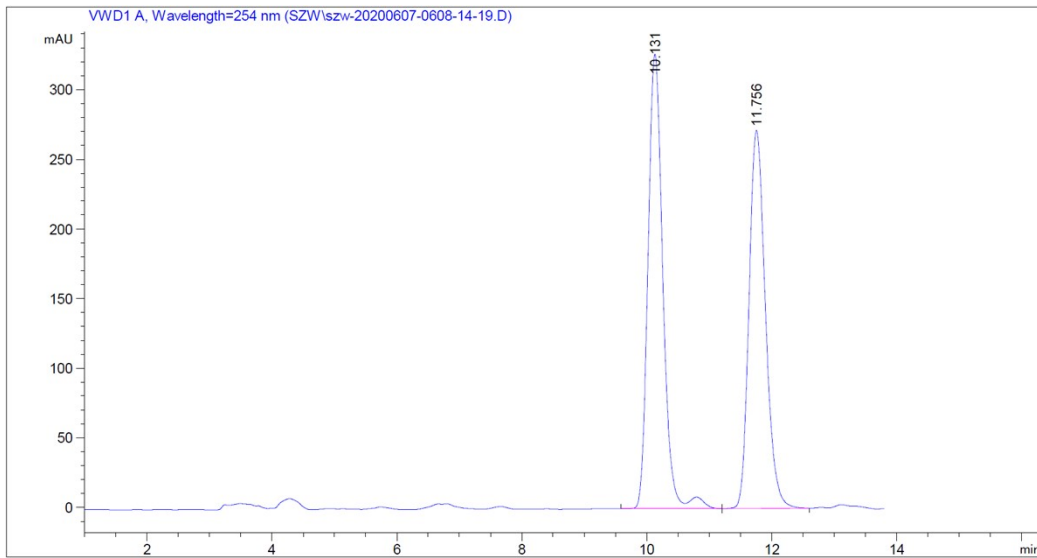
NAME      new100M
EXPNO    1
PROCNO   1
Date_    20200524
Time     11:01 h
INSTRUM  Avance
PROBHD   116098_041 4
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SWH      25800.000 Hz
F2DRSB   0.763303 Hz
AQ       1.3197700 sec
RG       61.7963
LW       20.000 usec
DE       6.50 usec
TE       299.3 K
D1       2.0000000 sec
D11      0.0300000 sec
TD0      1
SFO1     100.6283593 MHz
NUC1     13C
PC       3.17 usec
SI       31.50 usec
SF       100.6127695 MHz
SR       100.6127695 MHz
WDM      SM
SFB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```



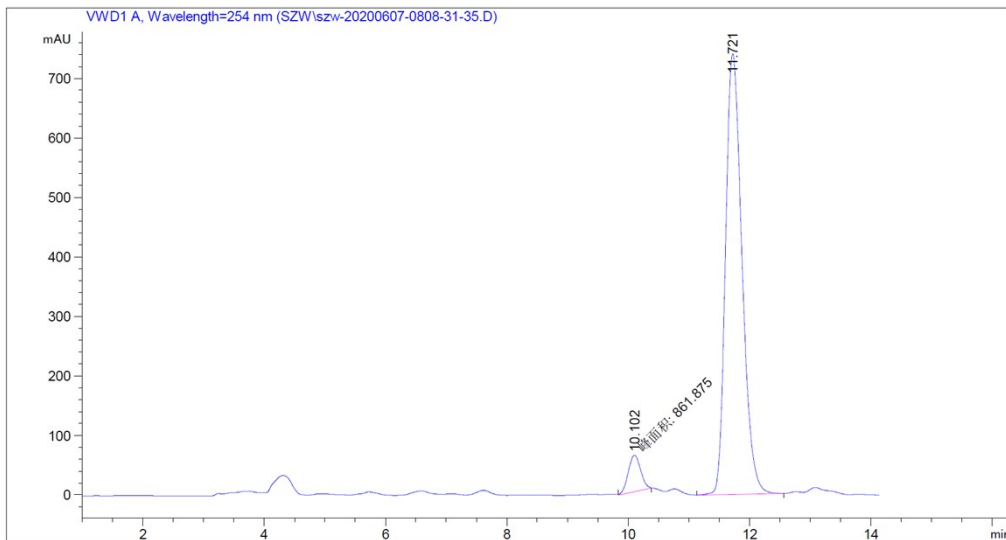
```

NAME          new100M
EXPNO         75
PROCNO        1
Date_         20201023
Time          11.03 h
INSTRUM       Avance
PROBHD        211609L_0051 4
PULPROG       zgpg
TD             131072
SOLVENT       CDCl3
AQ            16
DS             4
SWH           9090.000 Hz
FIDRES        1.381163 Hz
AQ            0.7209160 sec
RG            303
DM            5.500 usec
DE            4.50 usec
TE            299.2 K
D1            1.0000000 sec
D11           0.0300000 sec
TD0
SFO1          376.460764 MHz
NUC1          13C
P1            18.00 usec
SI            65536
SF            376.4931662 MHz
WDM           EM
GB            0
LB            0.30 Hz
GB            0
PC            1.00

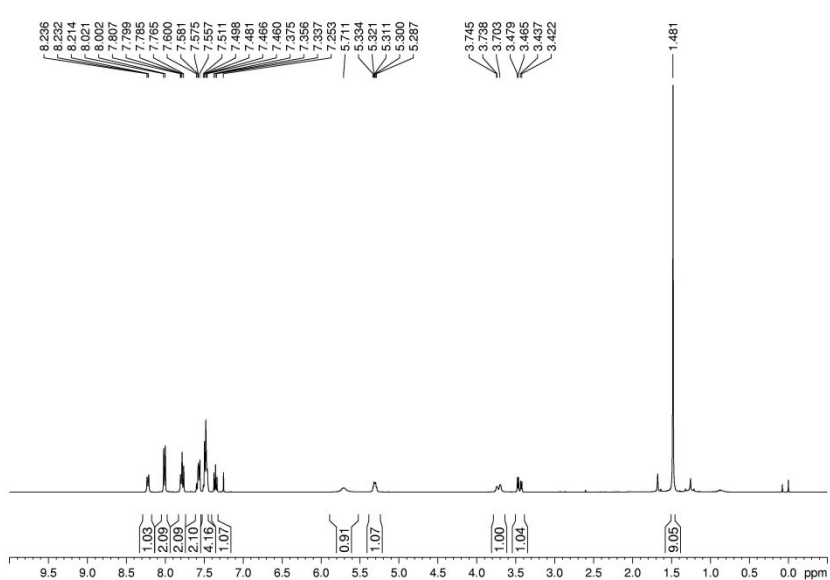
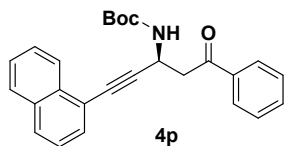
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.131	BV R	0.2515	5413.01563	326.37436	52.1961
2	11.756	BB	0.2829	4957.52197	271.63394	47.8039

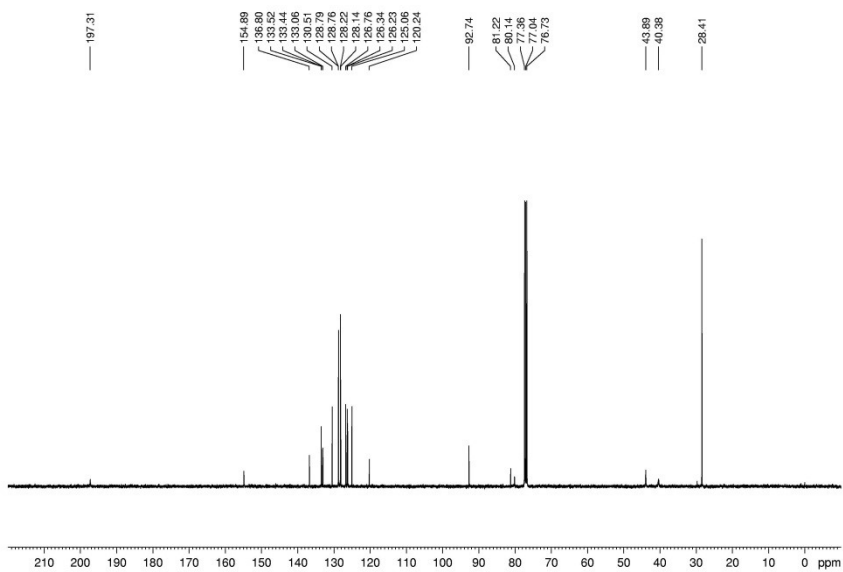


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.102	MM	0.2354	861.87463	61.02960	5.8144
2	11.721	BB	0.2939	1.39611e4	740.56122	94.1856



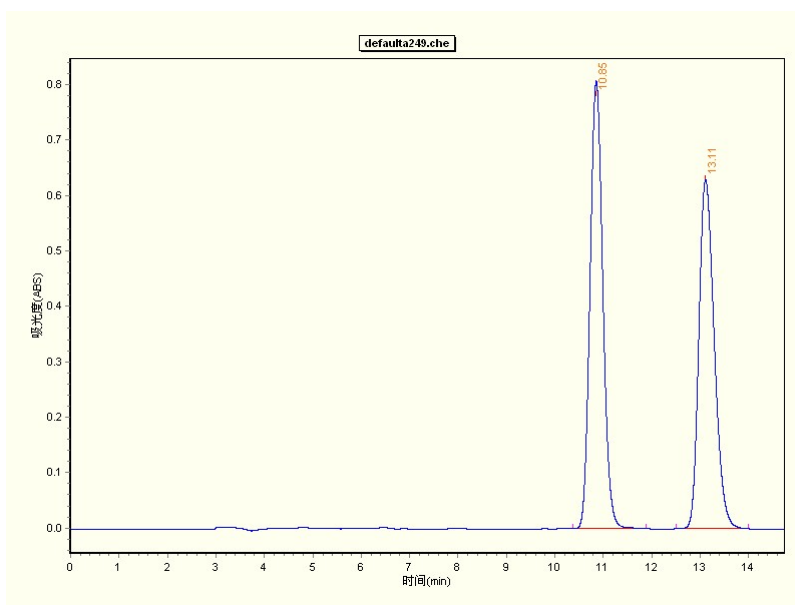
```

NAME          new400M
EXPNO         43
PROCNO        1
DATE_         20200424
Time         16.08 h
INSTRUM       Avance
PROCBDP       Z11609H_0661.f
PULPROG       zgpg30
ID            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           5555.556 Hz
FIDRES        0.149542 Hz
AQ           3.498282 sec
RG           96.8992
DM           90.000 usec
DE           9.45 usec
TE           295.3 K
D1           1.0000000 sec
TD           1
SFO1          400.1321847 MHz
NUC1          13C
PD           3.50 usec
PT           10.50 usec
SI           65536
SF           400.1300121 MHz
WDW           EM
SFR           0
GB           0.30 Hz
OB           0
PC           1.00
  
```

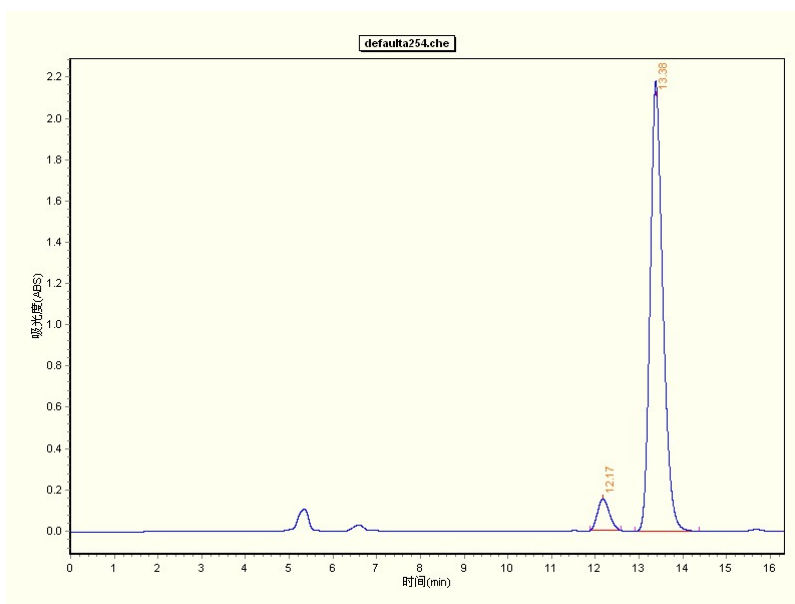


```

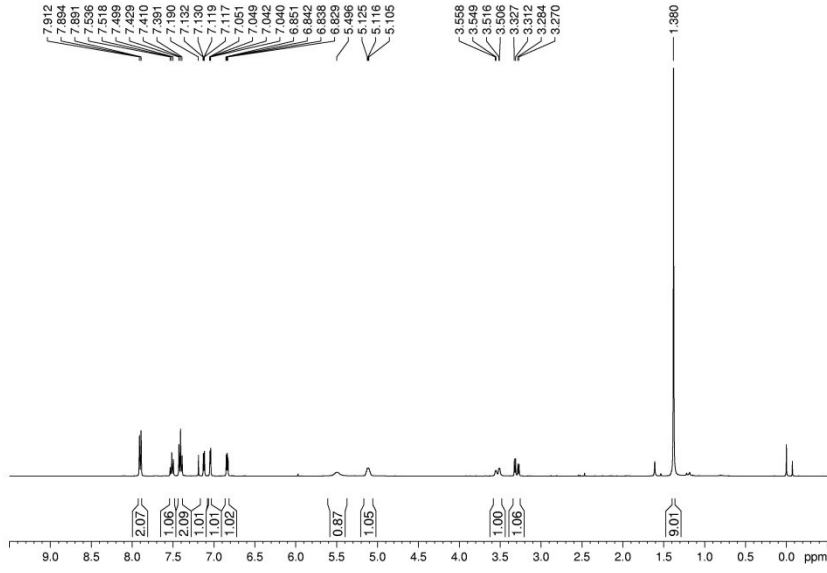
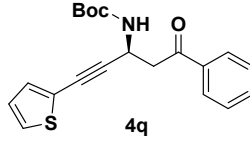
NAME          new400M
EXPNO         44
PROCNO        1
DATE_         20200424
Time         16.08 h
INSTRUM       Avance
PROCBDP       Z11609H_0661.f
PULPROG       zgpg30
ID            65536
SOLVENT       CDCl3
NS            2
DS            0
SWH           25000.000 Hz
FIDRES        2.762939 Hz
AQ           1.310700 sec
RG           96.354
DM           20.000 usec
DE           4.50 usec
TE           295.3 K
D1           2.0000000 sec
D11          0.0300000 sec
TD           1
SFO1          100.6283397 MHz
NUC1          13C
PD           3.17 usec
PT           45.00 usec
SI           32768
SF           100.6127865 MHz
WDW           EM
SFR           0
GB           3.00 Hz
OB           0
PC           3.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	10.85	7422476	404058	51.71%	1.519	BB
2	13.11	6930261	314859	48.29%	1.490	BB

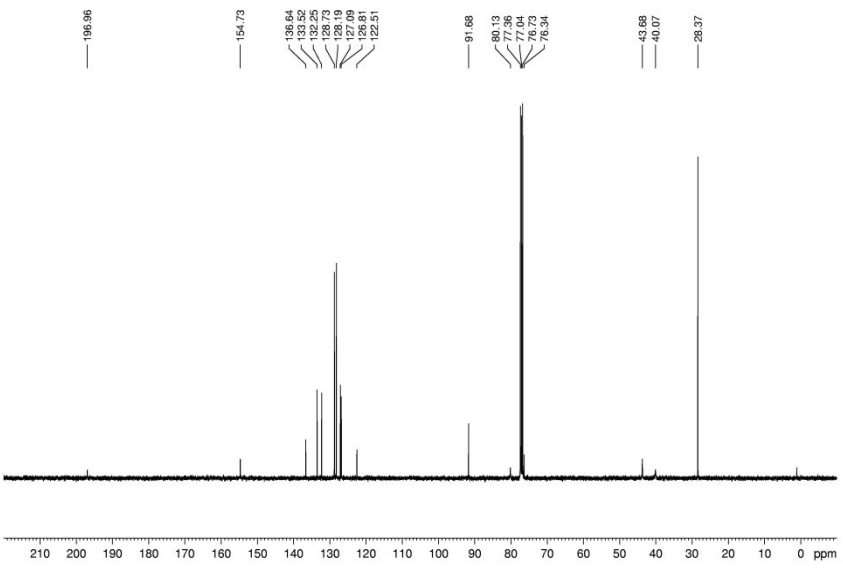


Entry	Retention time	Area	Height	Area%	Width	Type
1	12.17	1425357	76021	6.10%	0.712	BB
2	13.38	21948603	1091256	93.90%	1.472	BB



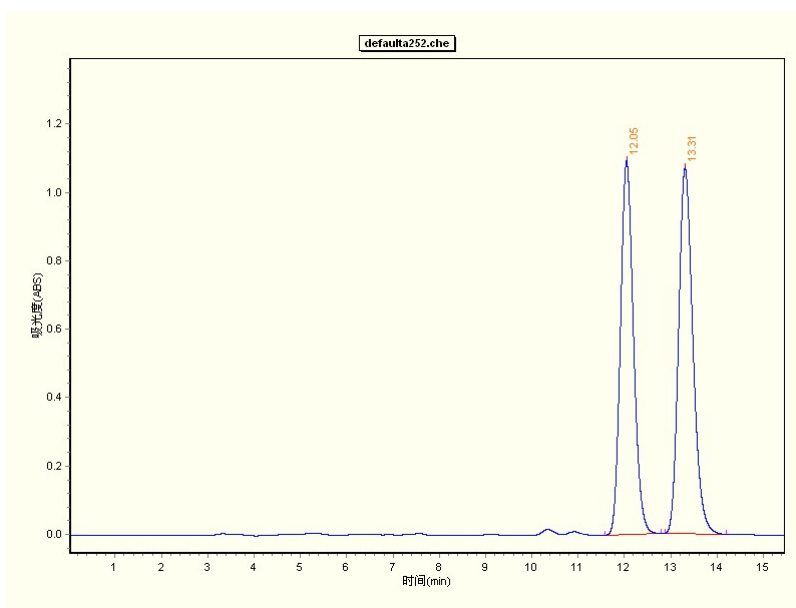
```

NAME      016400M
EXPNO    1
PROCNO   1
Date_    20200430
Time     13.33
INSTRUM  spect
PROBHD   5 mm PABBO 85/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SWH      8012.820 Hz
FIDRES   0.122266 Hz
AQ       4.0594966 sec
RG       35.34
DW       62.400 usec
DE       6.50 usec
TE       292.2 K
D1       1.0000000 sec
TDO      1
----- CHANNEL f1 -----
SFO1     400.1522000 MHz
NUC1      1H
P1        10.75 usec
SI        65536
SF        400.1500377 MHz
WDR       EM
SFO2      0
NUC2      0
LB        0.30 Hz
GB        0
PC        1.00
  
```

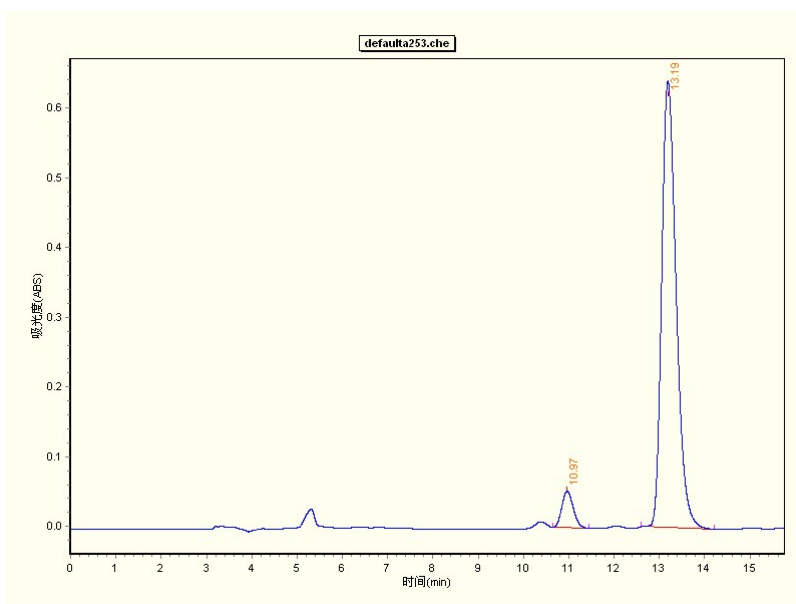


```

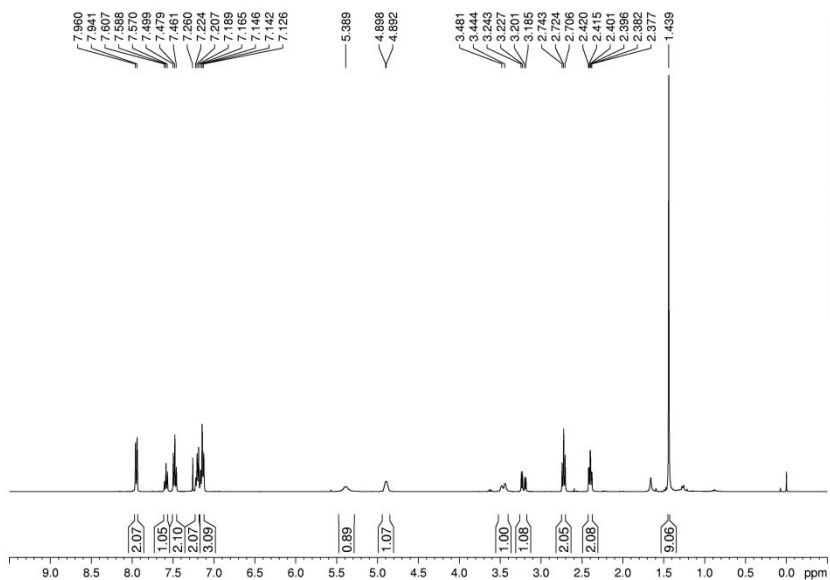
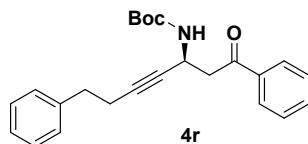
NAME      016400M
EXPNO    2
PROCNO   1
Date_    20200430
Time     13.44
INSTRUM  spect
PROBHD   5 mm PABBO 85/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       8
DS       0
SWH      25252.400 Hz
FIDRES   0.388323 Hz
AQ       1.276428 sec
RG       38.14
DW       19.800 usec
DE       6.50 usec
TE       292.2 K
D1       2.0000000 sec
D11      0.0300000 sec
TDO      2
----- CHANNEL f1 -----
SFO1     100.6281619 MHz
NUC1      13C
P1        12.50 usec
SI        32768
SF        100.6177860 MHz
WDR       EM
SFO2      0
NUC2      0
LB        1.00 Hz
GB        0
PC        1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	12.05	10658815	546214	48.06%	1.193	BB
2	13.31	11520756	535578	51.94%	1.320	BB



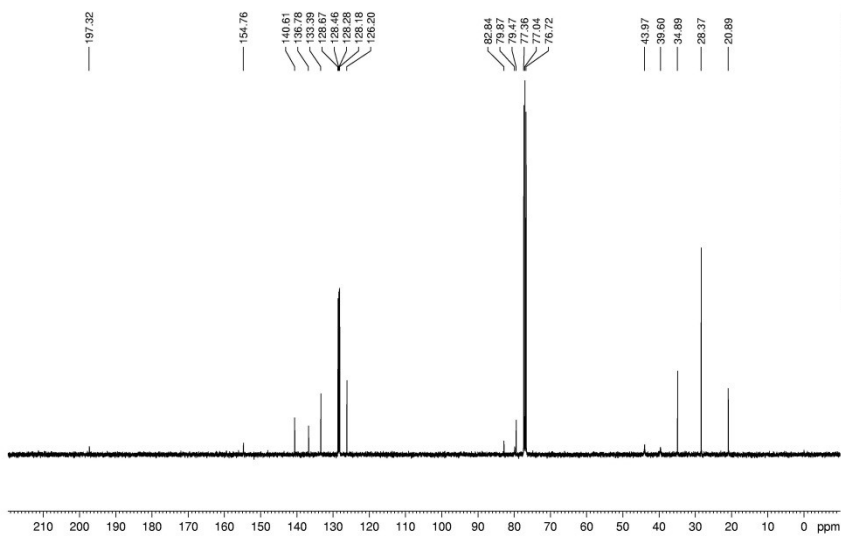
Entry	Retention time	Area	Height	Area%	Width	Type
1	10.97	456532	26151	6.05%	0.812	BB
2	13.19	7087629	319686	93.95%	1.609	BB



```

NAME      e1d400M
EXPNO    1
PROCNO   1
Date_    20200430
Time     14.24
INSTRUM  spect
PROBHD   5 mm PABBO BB7
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
DS        0
SWH       8012.820 Hz
FIDRES   0.122266 Hz
AQ        4.0894966 sec
RG         63.9
DM        62.400 usec
DE        6.30 usec
TE        293.0 K
D1        1.0000000 sec
TD0       1
===== CHANNEL f1 =====
SFO1     400.1522098 MHz
NUC1      1H
P1        10.75 usec
SI        65536
SF        400.1500097 MHz
RGW       EM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

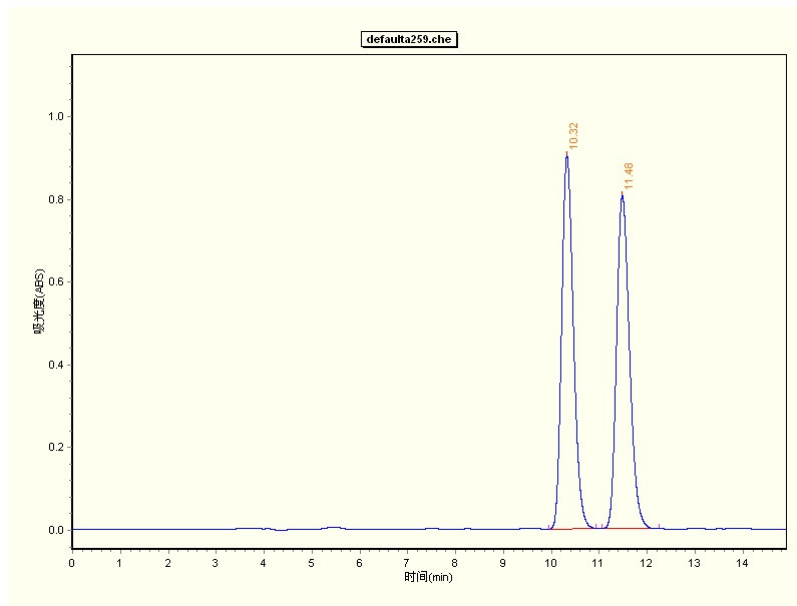
```



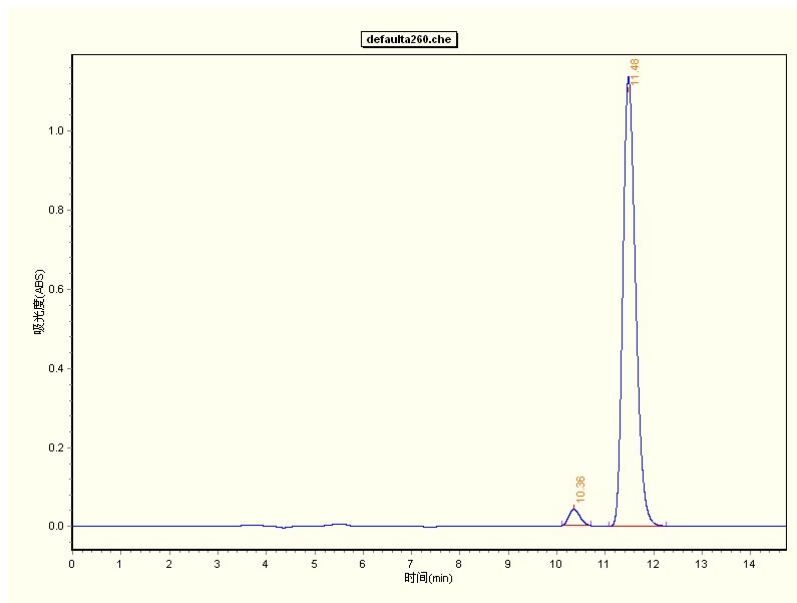
```

NAME      e1d400M
EXPNO    2
PROCNO   1
Date_    20200430
Time     14.27
INSTRUM  spect
PROBHD   5 mm PABBO BB7
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
DS        0
SWH       25252.525 Hz
FIDRES   0.395223 Hz
AQ        1.2376629 sec
RG         95.85
DM        13.000 usec
DE        6.30 usec
TE        293.1 K
D1        2.0000000 sec
D11       0.0300000 sec
TD0       1
===== CHANNEL f1 =====
SFO1     100.6283629 MHz
NUC1      13C
P1        10.50 usec
SI        32768
SF        100.6177980 MHz
RGW       EM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

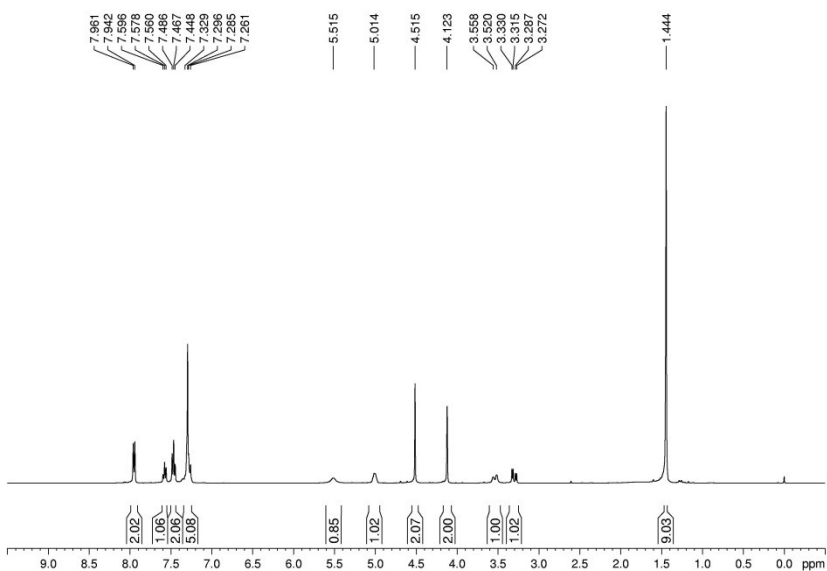
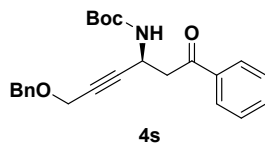
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	10.32	7694270	451896	50.42%	0.990	BB
2	11.48	7566181	403435	49.58%	1.197	BB

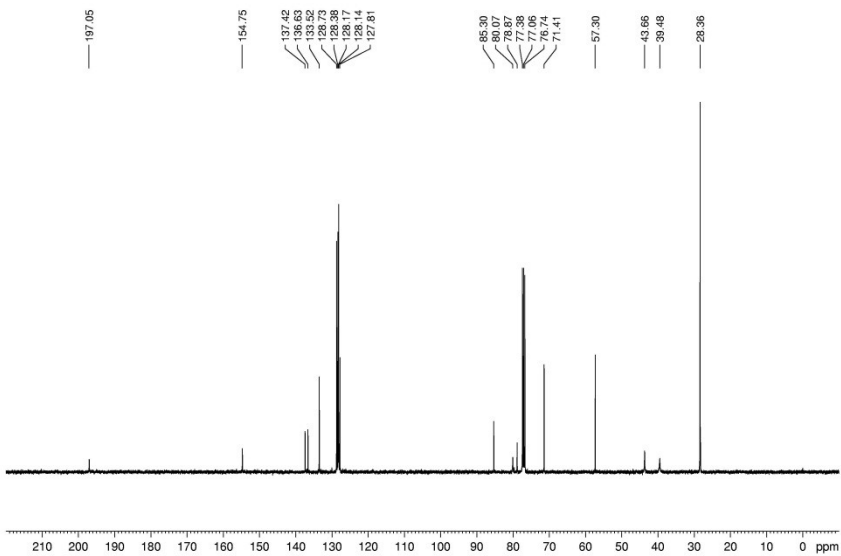


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.36	327435	20654	3.07%	0.598	BB
2	11.48	10322151	567963	96.93%	1.174	BB



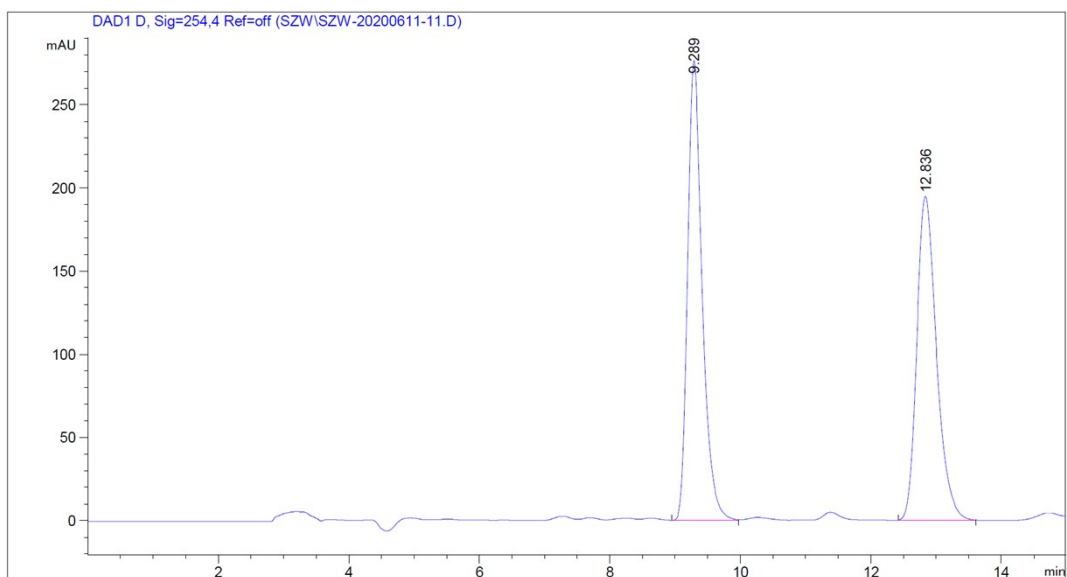
```

NAME          new400M
EXPNO         98
PROCNO        1
Date_         2020031
Time          20.00 h
INSTRUM       Avance
PROBHD        z116098_0061 4
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           5555.536 Hz
F2           0.163942 Hz
AQ           5.8982302 sec
RG           65.5
DE           30.000 usec
TE           296.5 K
D1           1.00000000 sec
D11          1
TD0          1
SFO1         400.1321847 MHz
NUC1          1H
P0           3.30 usec
P1           10.30 usec
SI           65536
SF           400.1300997 MHz
MEW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
  
```

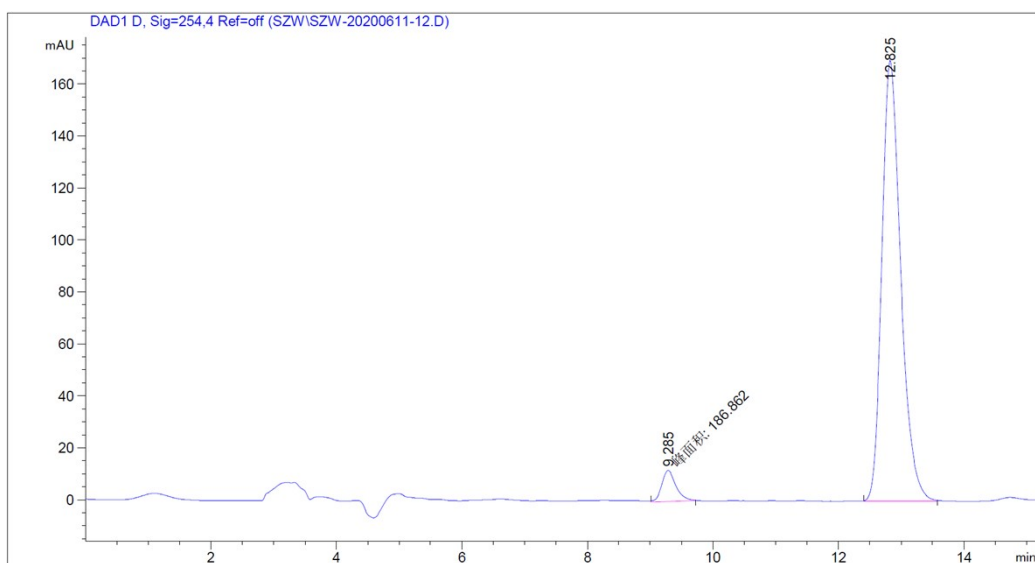


```

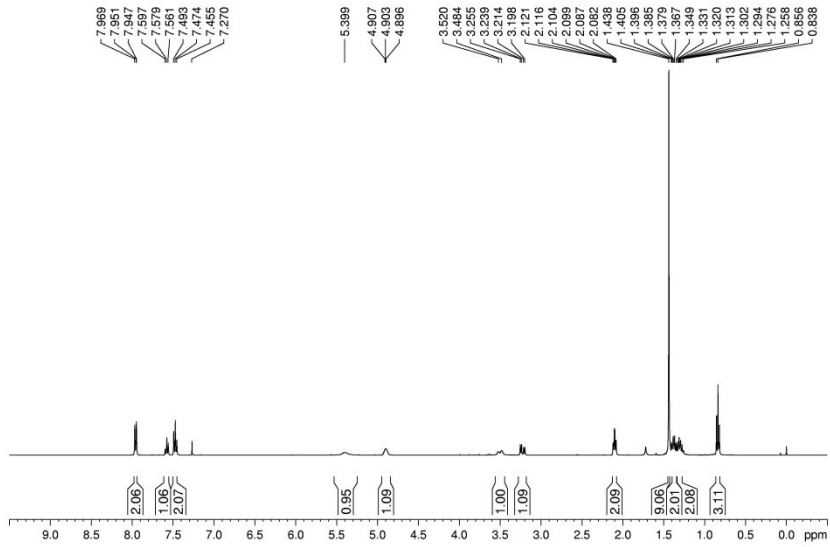
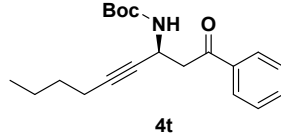
NAME          new400M
EXPNO         99
PROCNO        1
Date_         2020031
Time          20.23 h
INSTRUM       Avance
PROBHD        z116098_0061 4
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            512
DS            0
SWH           25000.000 Hz
F2           0.762939 Hz
AQ           1.3107700 sec
RG           101
DE           20.000 usec
TE           296.5 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
SFO1         100.6238399 MHz
NUC1          13C
P0           3.17 usec
P1           3.50 usec
SI           32768
SF           100.6127689 MHz
MEW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.289	VB	0.2373	4295.22754	276.40607	51.2198
2	12.836	BB	0.3210	4090.64502	194.78049	48.7802

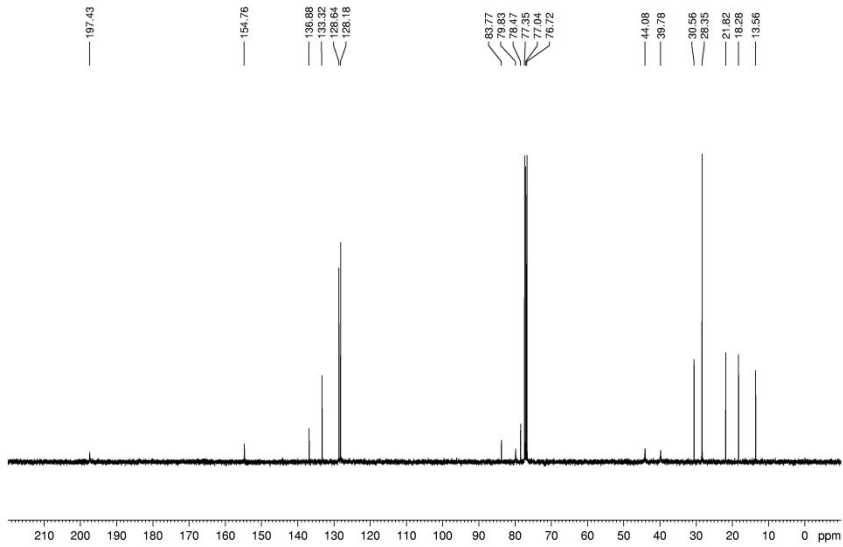


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.285	MM	0.2609	186.86200	11.93804	5.0061
2	12.825	BB	0.3199	3545.85596	169.57979	94.9939



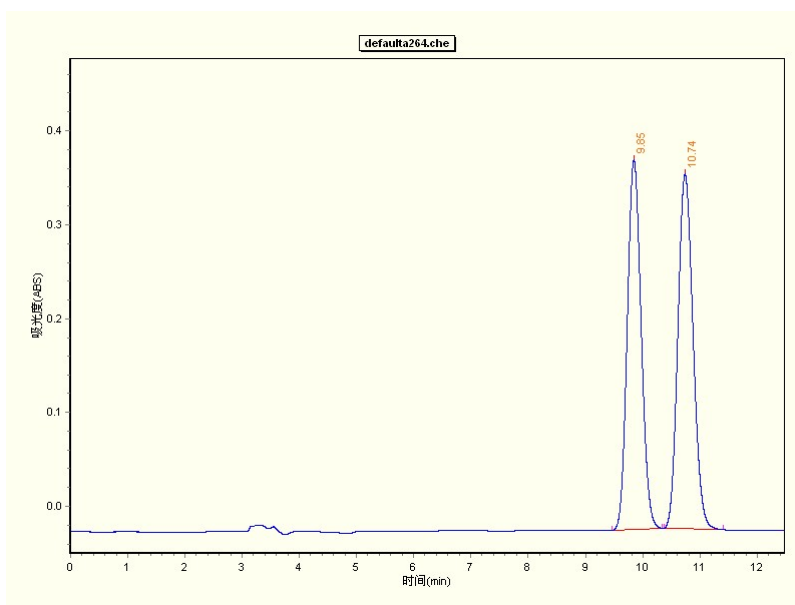
```

NAME      o14400M
EXPNO     1
PROCNO    1
Date_     20200430
Time      14.02
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         8
SWH        8012.820 Hz
FIDRES     0.122266 Hz
AQ         4.081866 sec
RG         32.37
DM         62.400 usec
DE         6.50 usec
TE         293.0 K
D1         1.0000000 sec
TD0        1
----- CHANNEL f1 -----
SFO1      400.150000 MHz
NUC1       1H
P1         10.75 usec
SI         65536
SF         400.150000 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

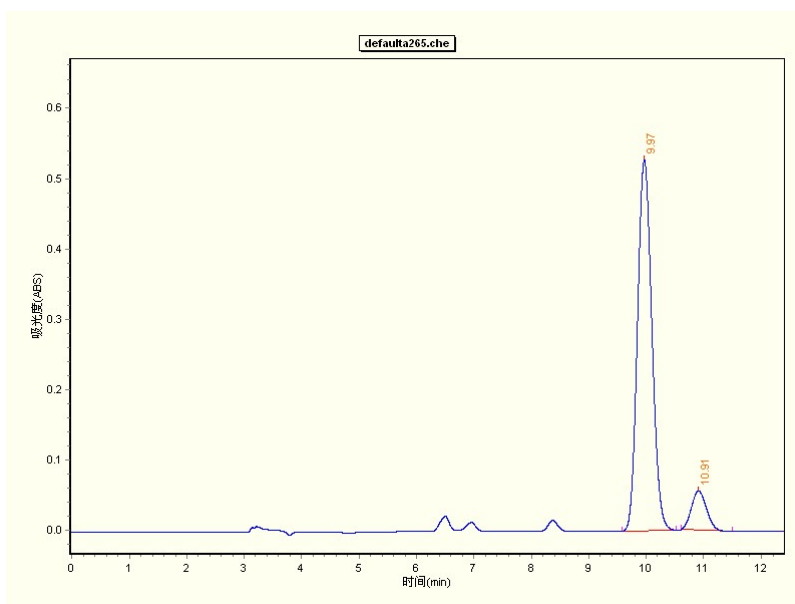


```

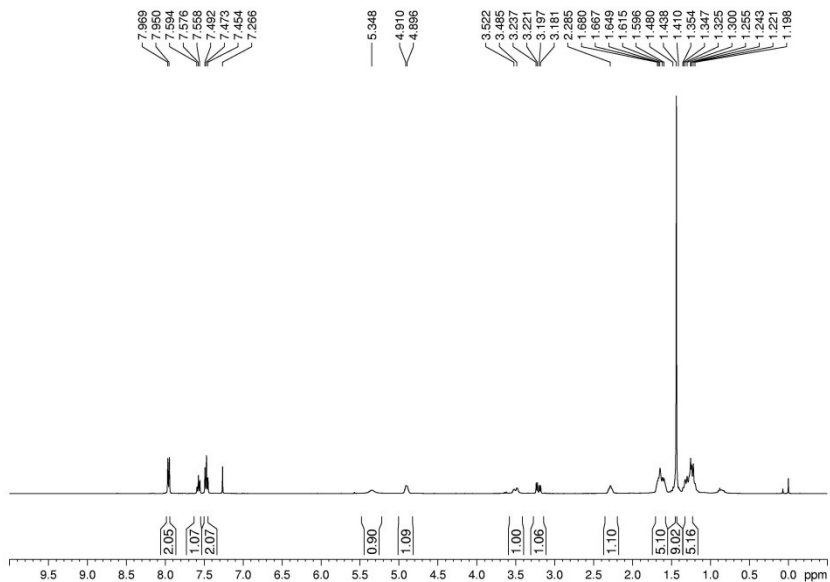
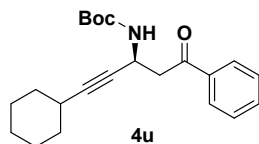
NAME      o14400M
EXPNO     60
PROCNO    1
Date_     20200430
Time      14.06
INSTRUM   spect
PROBHD    5 mm PABBO BB/
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         294
DS         6
SWH        25252.525 Hz
FIDRES     0.395323 Hz
AQ         1.237629 sec
RG         195.85
DM         19.800 usec
DE         6.50 usec
TE         293.15 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
----- CHANNEL f1 -----
SFO1      100.6283629 MHz
NUC1       13C
P1         10.50 usec
SI         32768
SF         100.6177960 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	9.85	3323443	197201	48.87%	0.874	BB
2	10.74	3476857	189107	51.13%	1.049	BB

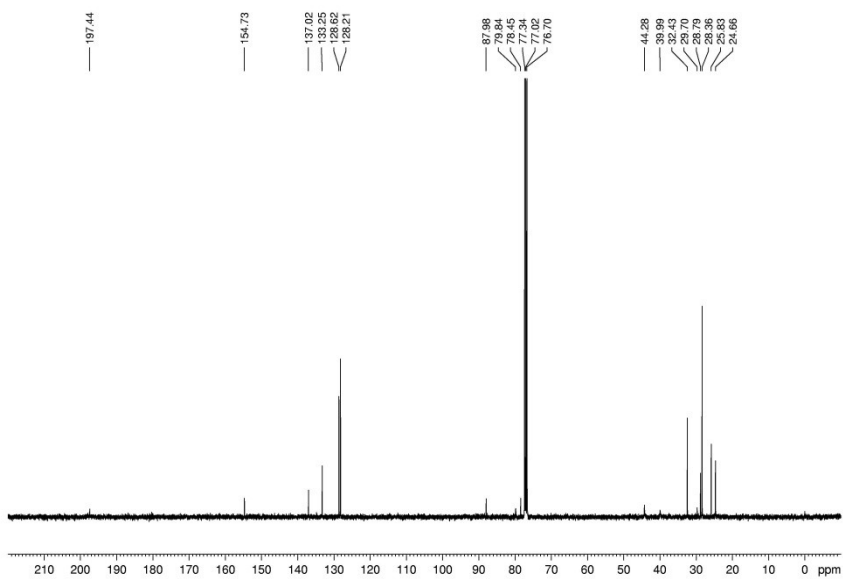


Entry	Retention time	Area	Height	Area%	Width	Type
1	9.97	4577295	263675	89.97%	0.949	BB
2	10.91	510091	27955	10.03%	0.887	BB



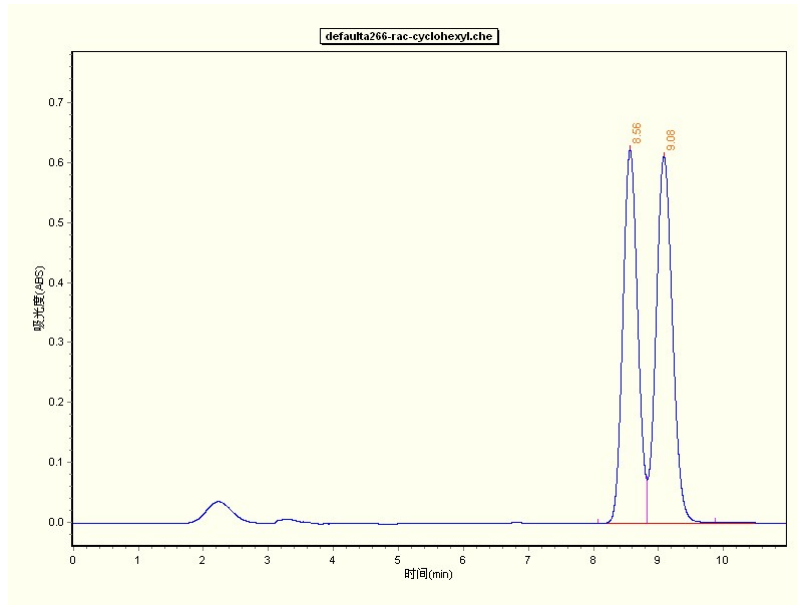
```

NAME          new400M
EXPNO         52
PROCNO        1
DATE_         20200430
Time          15.21 h
INSTRUM       Avance
PROBHD        Z116098_0861 f
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SHE          5555.556 Hz
FIDRES       0.169942 Hz
AQ           5.8992902 sec
RG           101
DM           90.000 usec
DE           9.46 usec
TE           295.2 K
D1           1.00000000 sec
D11          1
TD0          1
SFO1         400.1321847 MHz
NUC1          13
PC           3.10 usec
P1           10.50 usec
SI           65536
SF           400.1300073 MHz
WPM          EM
SFOB         0
LB           0.30 Hz
GB           0
PC           1.00
  
```

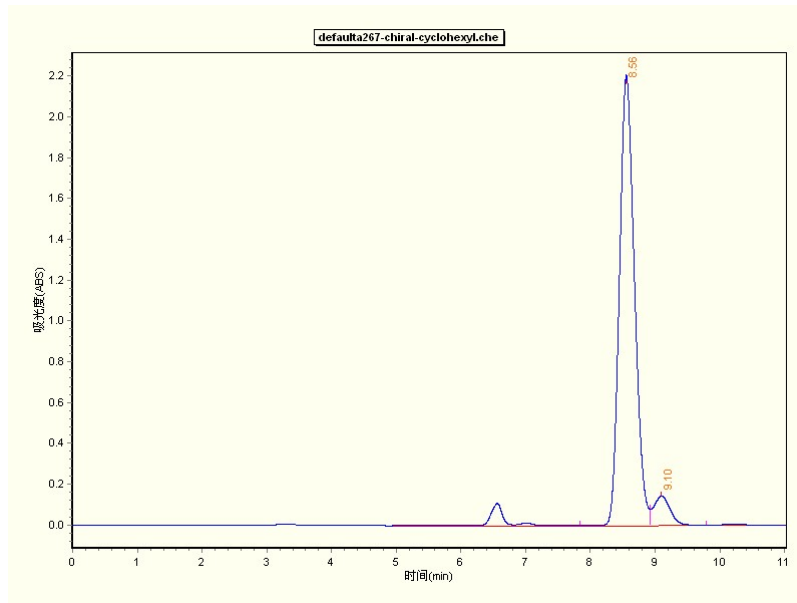


```

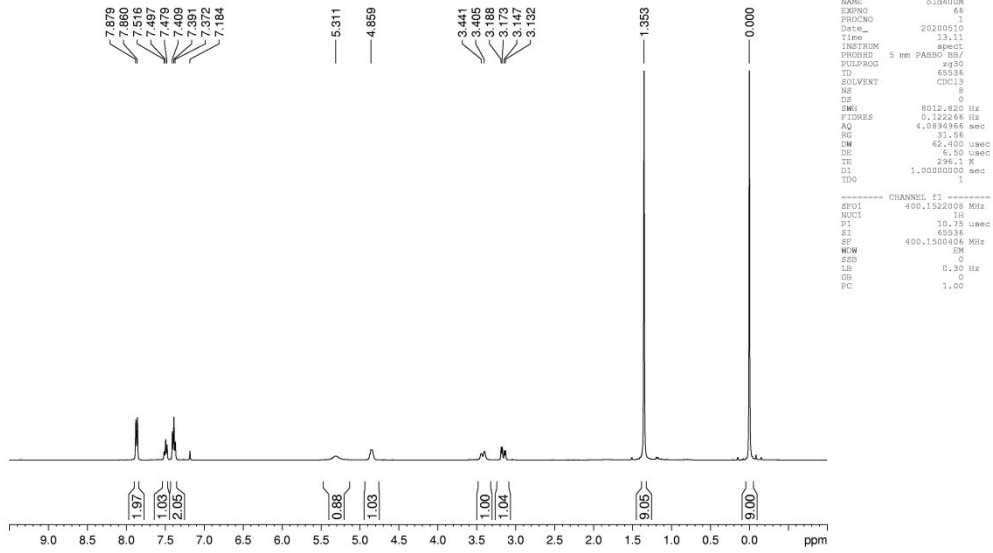
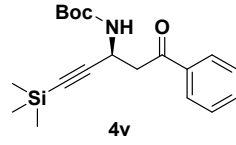
NAME          new400M
EXPNO         35
PROCNO        1
DATE_         20200430
Time          15.50 h
INSTRUM       Avance
PROBHD        Z116098_0861 f
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SHE          25000.000 Hz
FIDRES       0.762939 Hz
AQ           1.1107705 sec
RG           57.9631
DM           20.000 usec
DE           6.50 usec
TE           295.2 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
SFO1         100.6238359 MHz
NUC1          13
PC           3.17 usec
P1           9.50 usec
SI           32768
SF           100.6127665 MHz
WPM          EM
SFOB         0
LB           1.00 Hz
GB           0
PC           1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	8.56	4910793	311011	47.87%	0.765	BB
2	9.08	5348086	305638	52.13%	1.046	BB



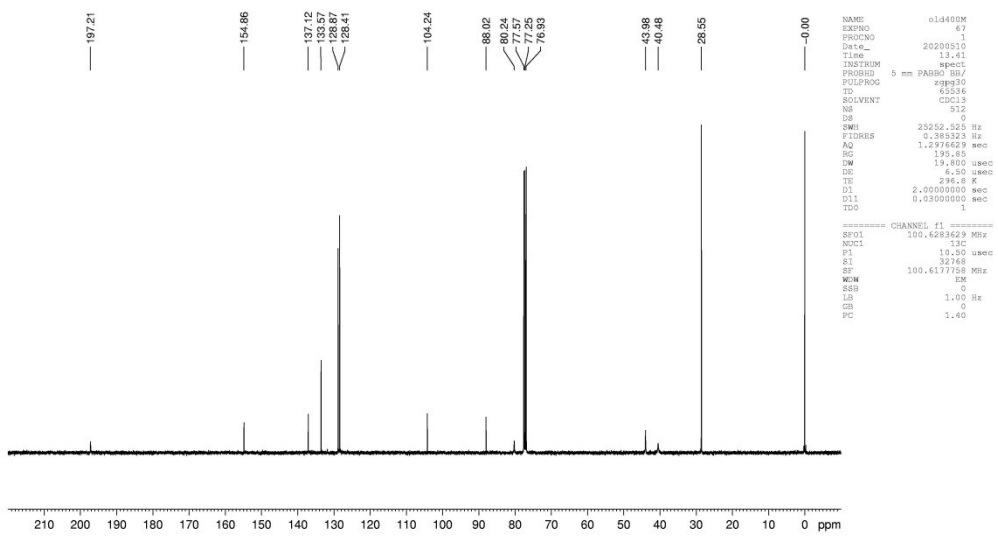
Entry	Retention time	Area	Height	Area%	Width	Type
1	8.56	17801933	1103182	93.34%	1.098	BB
2	9.10	1269200	71531	6.66%	0.867	BB



```

NAME      014400M
EXPNO    66
PROCNO   1
Date_    20200510
Time     13.11
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       0
DS       0
SWH      8012.820 Hz
FIDRES   0.122286 Hz
AQ       4.084966 sec
RG       31.56
DM       82.000 usec
DE       6.50 usec
TE       296.1 K
TD0      1.00000000 sec
TD0      1

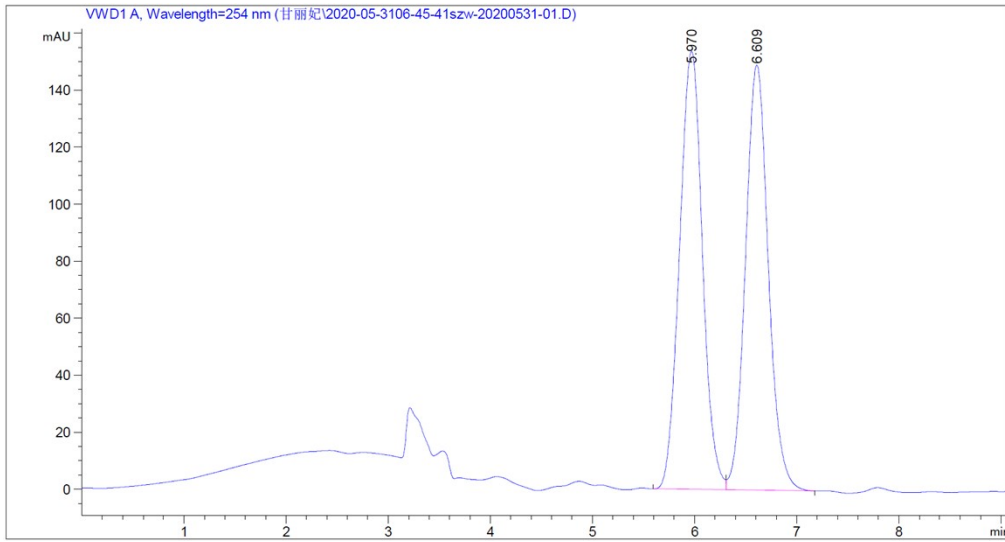
===== CHANNEL f1 =====
SF01     400.1522008 MHz
NUC1     13C
P1       16.75 usec
SFO1     101.6263429 MHz
SF       100.6177758 MHz
PC       1.00
  
```



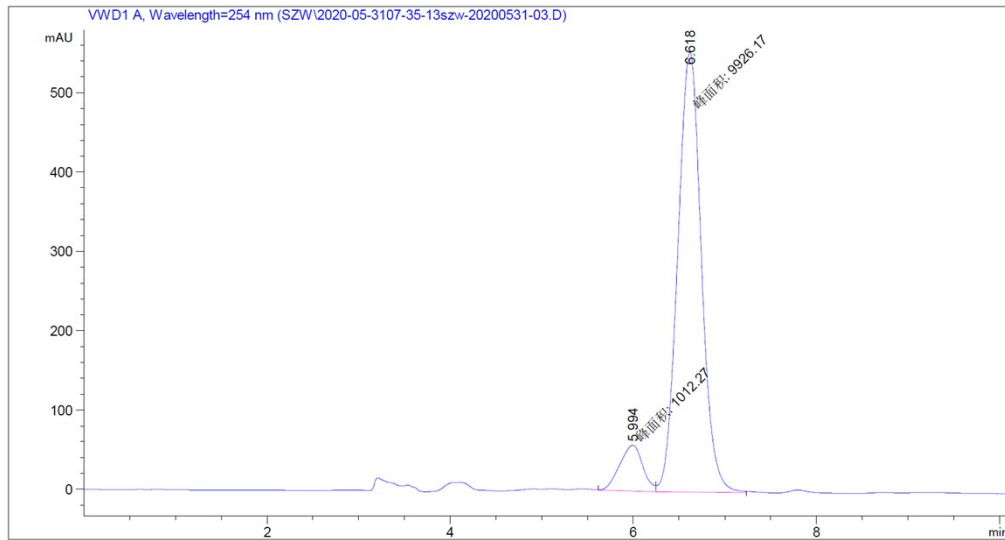
```

NAME      014400M
EXPNO    67
PROCNO   1
Date_    20200510
Time     13.41
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD       65536
SOLVENT  CDCl3
NS       0
DS       0
SWH      25252.525 Hz
FIDRES   0.388323 Hz
AQ       1.2976629 sec
RG       195.85
DM       19.800 usec
DE       6.50 usec
TE       296.1 K
TD0      2.00000000 sec
TD0      0.83000000 sec
TD0      1

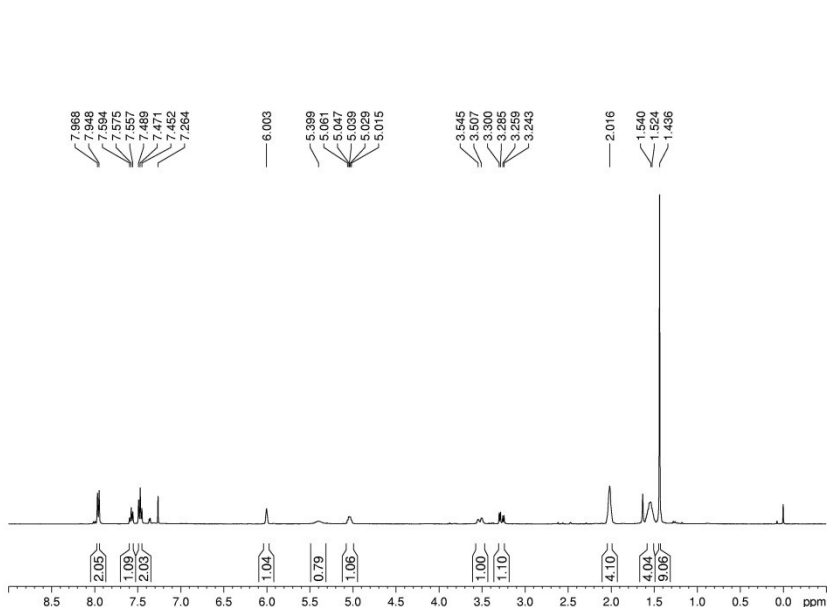
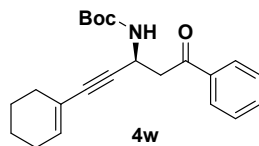
===== CHANNEL f1 =====
SF01     100.6263429 MHz
NUC1     13C
P1       16.75 usec
SFO1     101.6263429 MHz
SF       100.6177758 MHz
PC       1.00
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.970	BV	0.2406	2391.64136	153.68553	50.7682
2	6.609	VB	0.2404	2319.26440	149.15930	49.2318

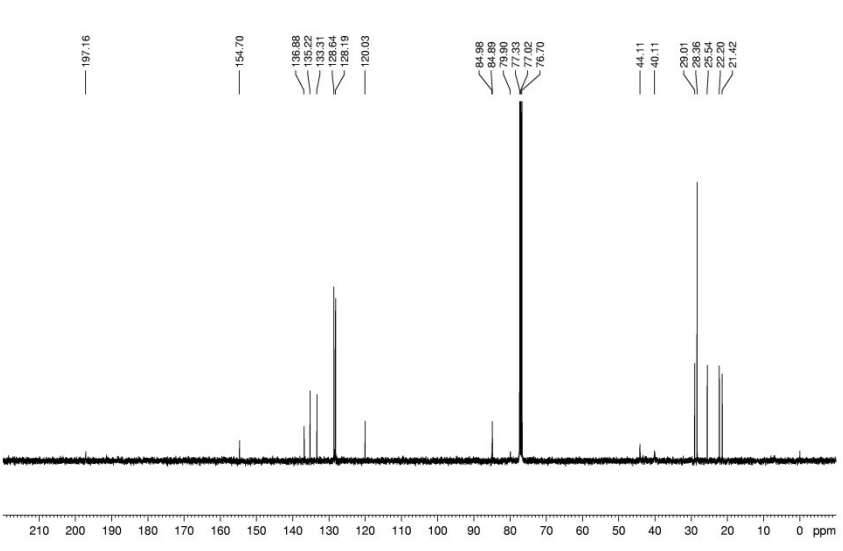


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	5.994	MM	0.2919	1012.26978	57.79446	9.2542
2	6.618	MM	0.2983	9926.17188	554.60516	90.7458



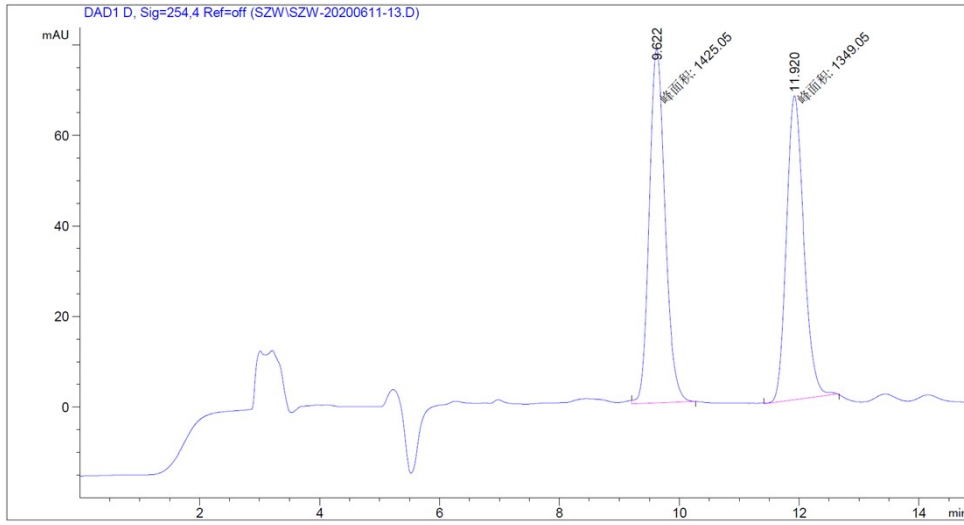
```

NAME          new400M
EXPNO         2
PROCNO        1
Date_         20200331
Time          18.20 h
INSTRUM       Avance
PROBHD        z116098_0841
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           555.546 Hz
FIDRES       0.160942 Hz
AQ           0.498250 sec
RG           101
DW           30.000 usec
DE           9.46 usec
TE           296.2 K
D1           1.0000000 sec
DECOR        1
STO1         400.1321947 MHz
NUC1         13
PC           3.50 usec
PI           9.50 usec
SFO         400.1300000 MHz
SF          400.1300000 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.40
  
```

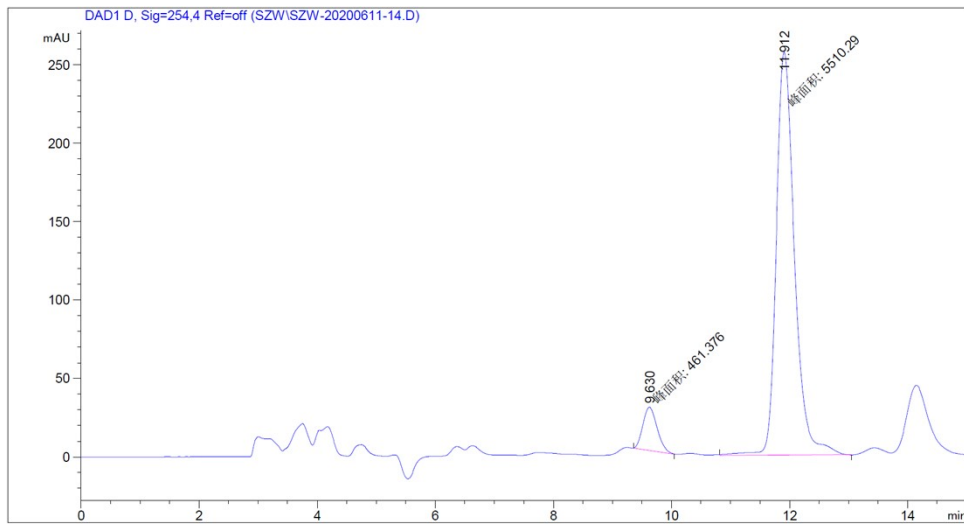


```

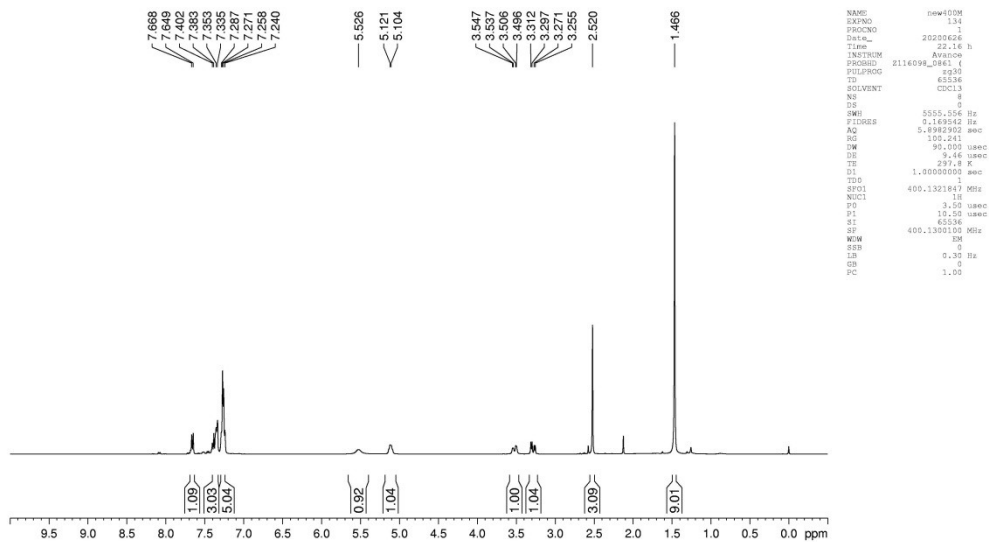
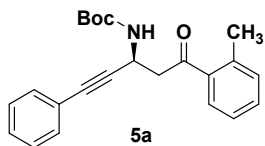
NAME          new400M
EXPNO         3
PROCNO        1
Date_         20200331
Time          18.49 h
INSTRUM       Avance
PROBHD        z116098_0841
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           25000.000 Hz
FIDRES       0.762939 Hz
AQ           1.3157700 sec
RG           101
DW           20.000 usec
DE           6.50 usec
TE           291.2 K
D1           2.0000000 sec
D11          0.0500000 sec
DECOR        1
STO1         100.6238359 MHz
NUC1         13
PC           3.17 usec
PI           9.50 usec
SFO         100.6238359 MHz
SF          100.6127465 MHz
WDW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
  
```



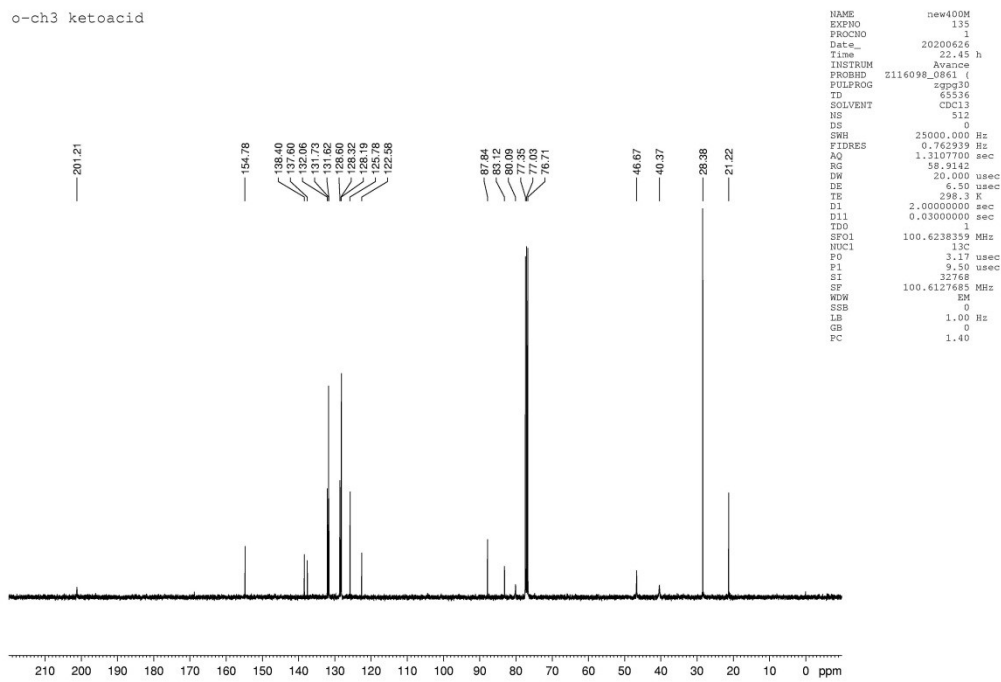
峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.622	MM	0.3037	1425.05383	78.20928	51.3699
2	11.920	MM	0.3346	1349.05017	67.18902	48.6301

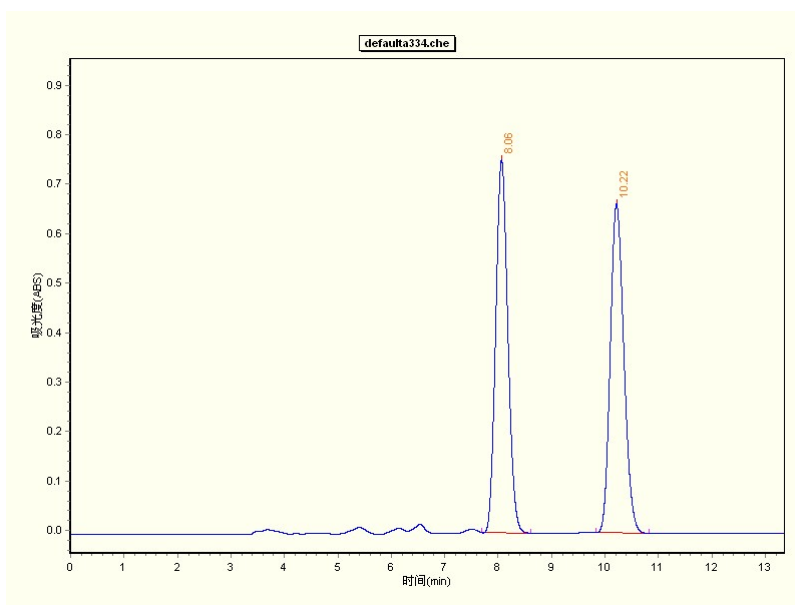


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.630	MM	0.2786	461.37567	27.59699	7.7261
2	11.912	MM	0.3574	5510.29199	256.98349	92.2739

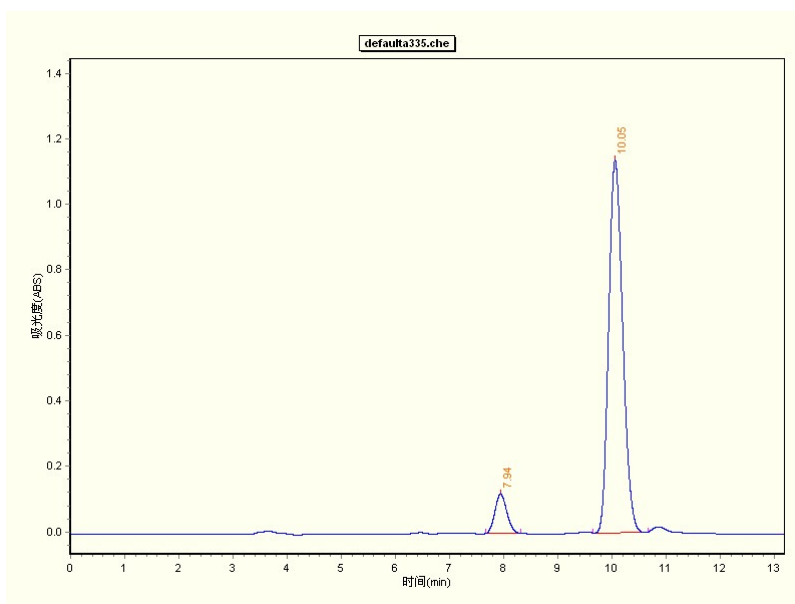


o-ch3 ketoacid

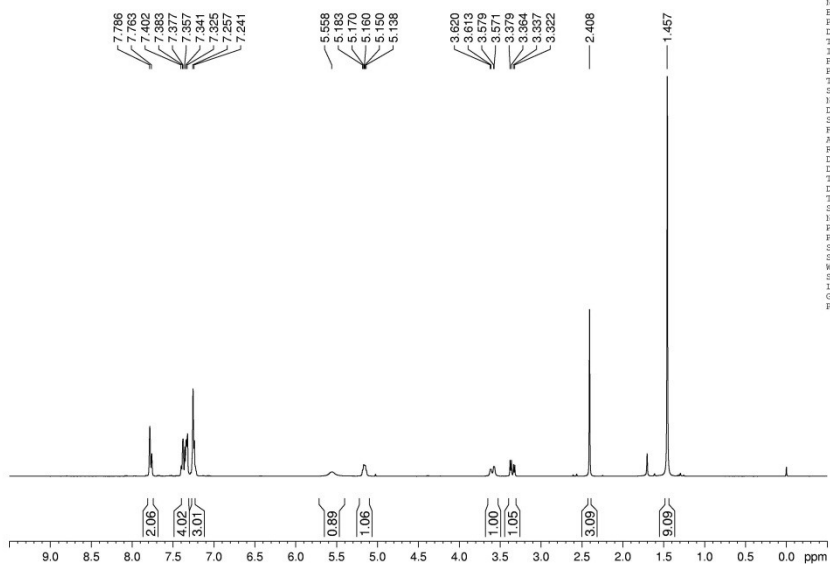
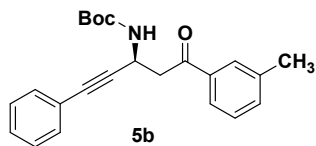




Entry	Retention time	Area	Height	Area%	Width	Type
1	8.06	5939027	376953	50.31%	0.927	BB
2	10.22	5865003	332065	49.69%	0.992	BB

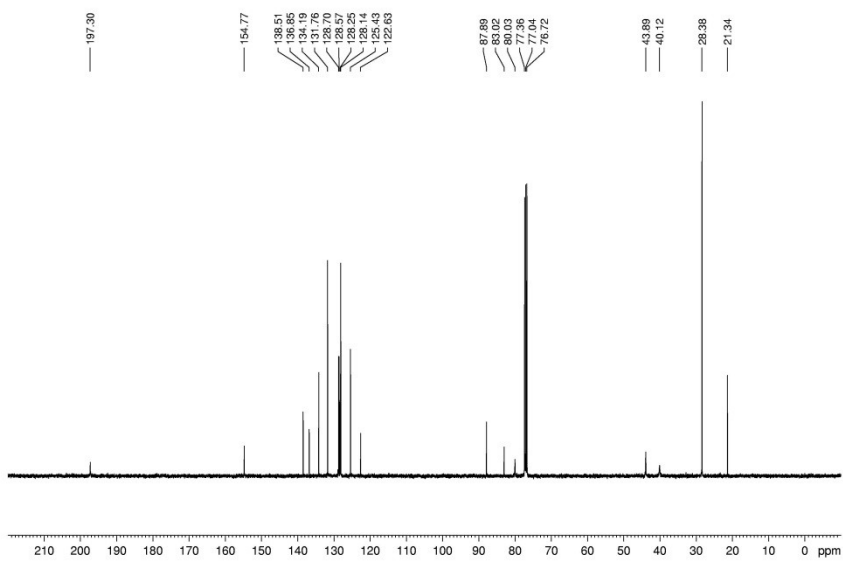


Entry	Retention time	Area	Height	Area%	Width	Type
1	7.94	915119	60205	8.26%	0.653	BB
2	10.05	10170311	568439	91.74%	1.019	BB



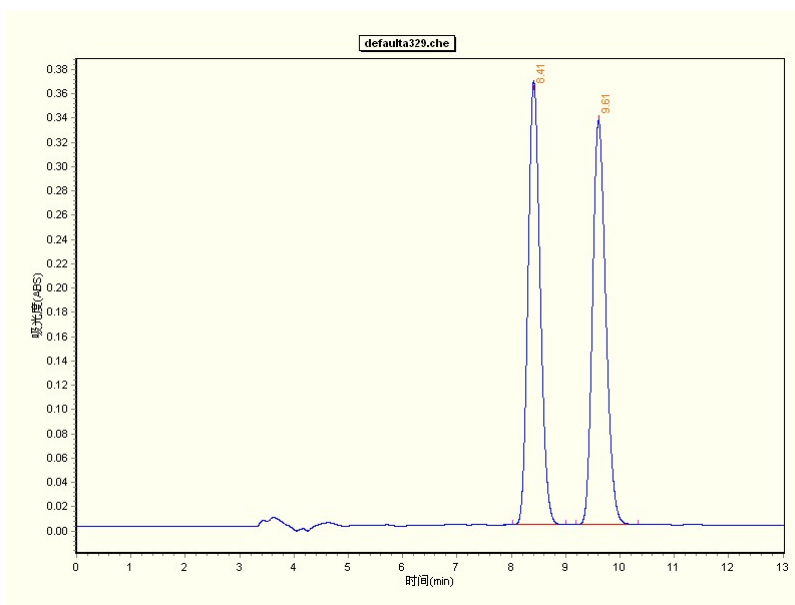
```

NAME          new400M
EXPNO         118
PROCNO       20200614
Date_        3.02 h
Time         2116098_0861.f
INSTRUM      Avance
PROBHD       zg30
PULPROG      zg30
TD           65536
SOLVENT      CDCl3
NS           8
DS           0
SWH          5555.556 Hz
FIDRES      0.169342 Hz
AQ           5.8982902 sec
RG           97.9624
DW           30.000 usec
DE           9.46 usec
TE           297.2 K
D1           1.00000000 sec
TDO         1
SFO1        400.1321647 MHz
NUC1         1H
P0           3.50 usec
P1           10.50 usec
SI           65536
SF           400.1300096 MHz
WDW          EM
SSB          0
LB           0.30 Hz
GB           0
PC           1.00
  
```

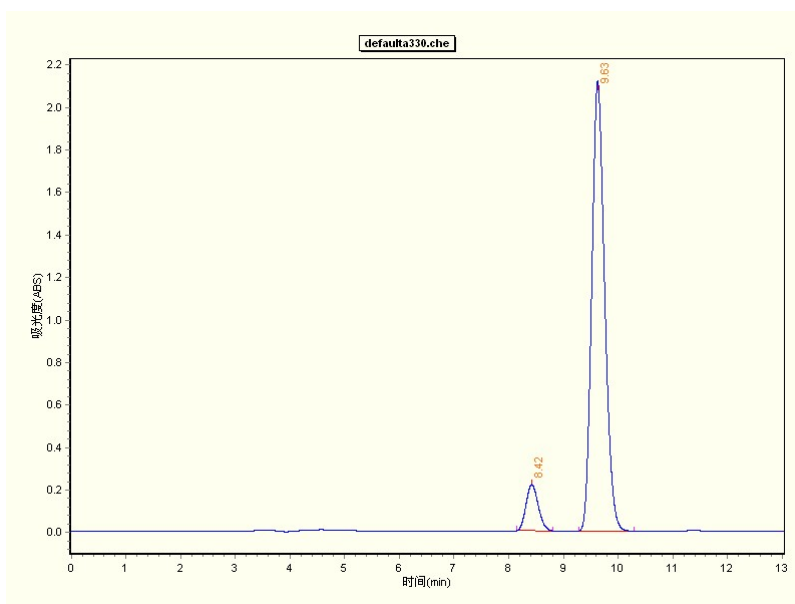


```

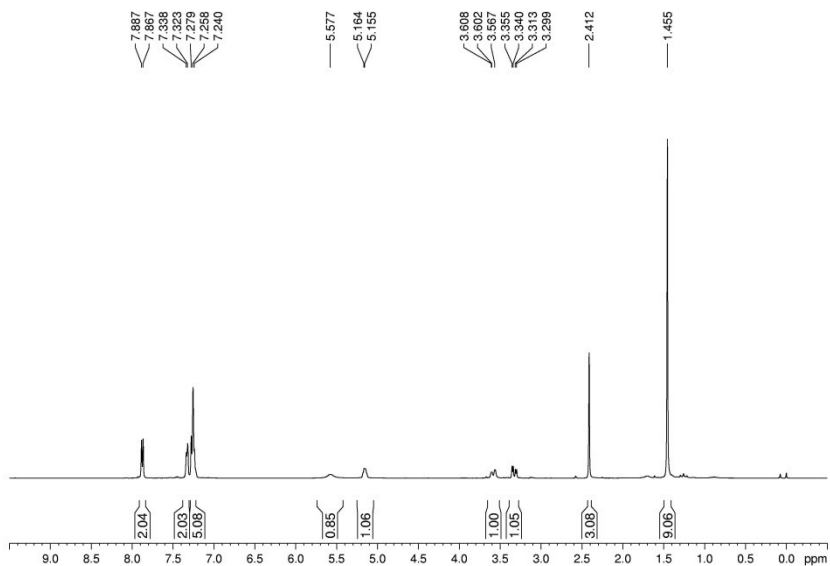
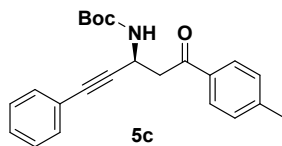
NAME          new400M
EXPNO         119
PROCNO       20200614
Date_        3.32 h
Time         2116098_0861.f
INSTRUM      Avance
PROBHD       zg30
PULPROG      zg30
TD           65536
SOLVENT      CDCl3
NS           8
DS           0
SWH          25000.000 Hz
FIDRES      0.762339 Hz
AQ           1.3107100 sec
RG           49.6221
DW           20.000 usec
DE           6.50 usec
TE           297.6 K
D1           2.00000000 sec
D11         0.03000000 sec
TDO         1
SFO1        100.6281519 MHz
NUC1         13C
P0           3.17 usec
P1           9.50 usec
SI           32768
SF           100.6127665 MHz
WDW          EM
SSB          0
LB           1.00 Hz
GB           0
PC           1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	8.41	2834198	182596	50.20%	0.987	BB
2	9.61	2811984	166437	49.80%	1.130	BB



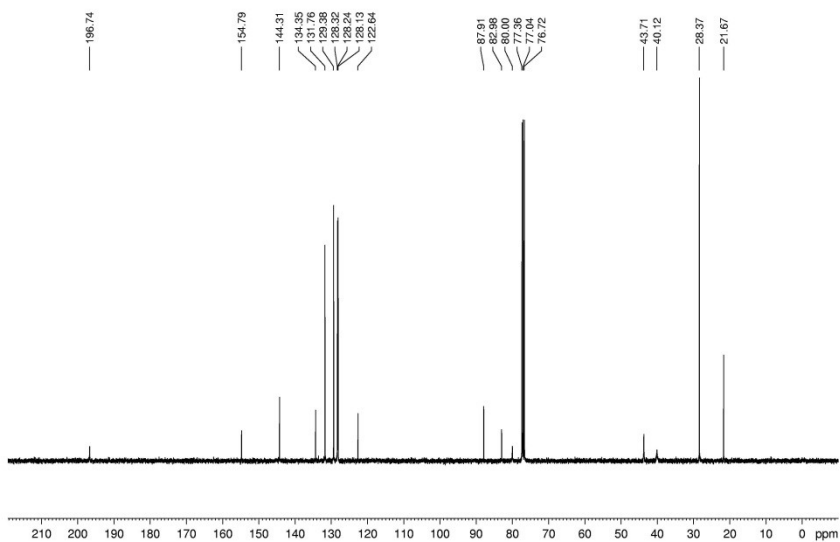
Entry	Retention time	Area	Height	Area%	Width	Type
1	8.42	1688366	108998	8.89%	0.660	BB
2	9.63	17300224	1058504	91.11%	1.022	BB



```

NAME      old400M
EXPNO    68
PROCNO   1
Date_    20200510
Time     13.46
INSTRUM  spect
PROBHD   5 mm PABBO BBI/
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       8012.820 Hz
FIDRES   0.122266 Hz
AQ        4.0894966 sec
RG        35.34
DW        62.400 usec
DE        4.50 usec
TE        296.5 K
D1        1.0000000 sec
TD0       1
===== CHANNEL f1 =====
SFO1     400.1522008 MHz
NUC1     1H
P1        10.75 usec
RF        400.1500101 MHz
WDM      DM
SSB       0
LB        0.30 Hz
GB        0
PC        1.00

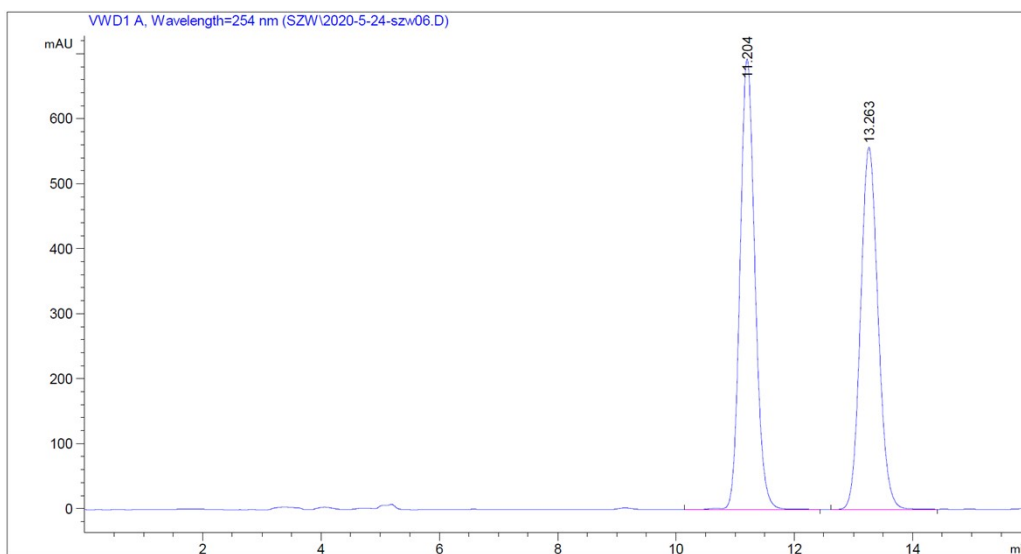
```



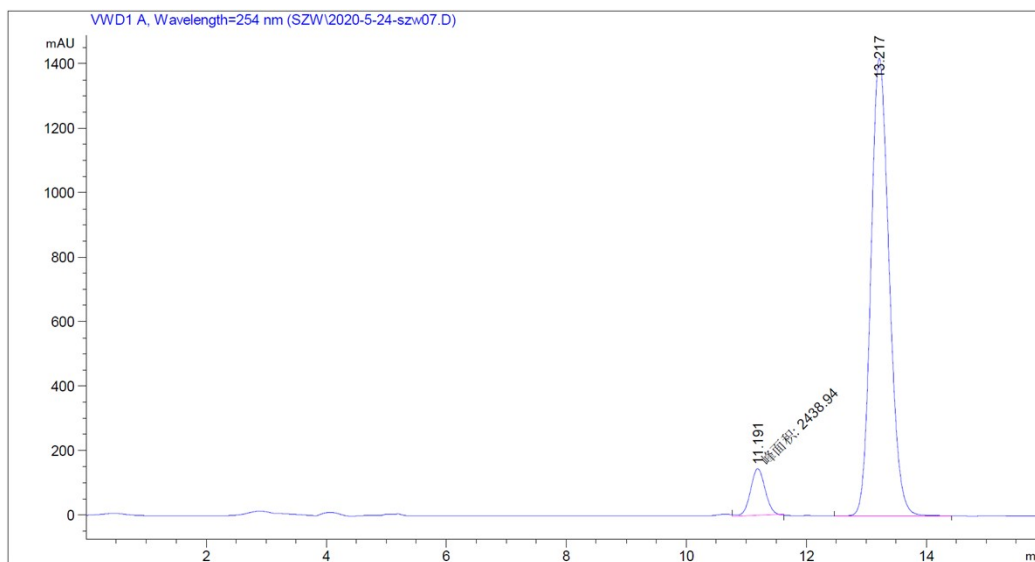
```

NAME      old400M
EXPNO    69
PROCNO   1
Date_    20200510
Time     14.16
INSTRUM  spect
PROBHD   5 mm PABBO BBI/
PULPROG  zgpg30
TD        65534
SOLVENT  CDCl3
NS        8
DS        0
SWH       25252.525 Hz
FIDRES   0.285323 Hz
AQ        1.2976623 sec
RG        181.40
DW        19.800 usec
DE        4.50 usec
TE        296.5 K
D1        2.0000000 sec
D11       0.0300000 sec
TD0       1
===== CHANNEL f1 =====
SFO1     100.6283623 MHz
NUC1     13C
P1        16.50 usec
RF        100.6179985 MHz
WDM      SM
SSB       0
LB        1.00 Hz
GB        0
PC        1.40

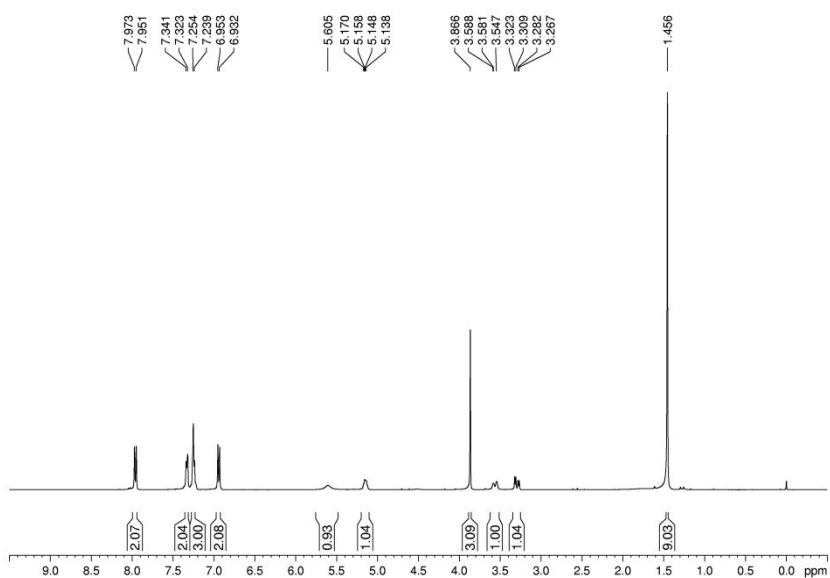
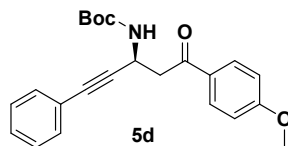
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.204	VV R	0.2713	1.21768e4	693.72913	51.4603
2	13.263	BB	0.3185	1.14857e4	557.19965	48.5397



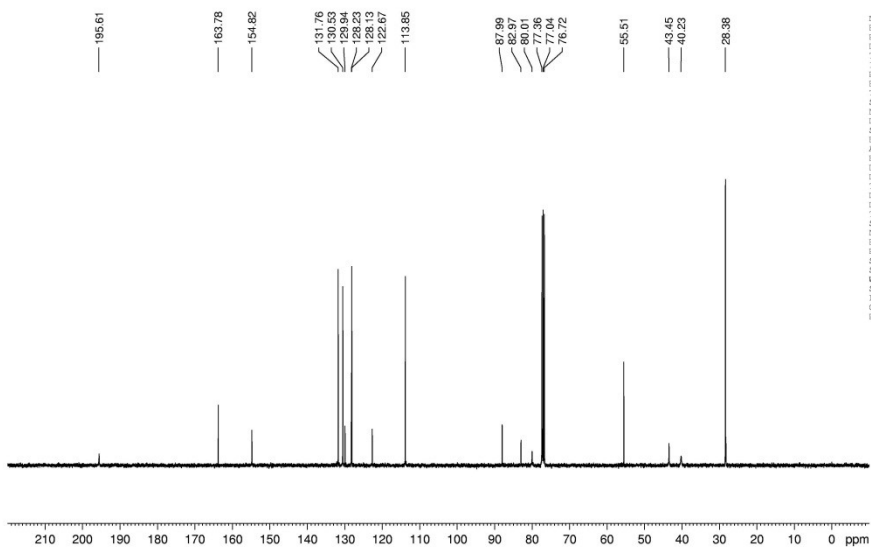
峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	11.191	MM	0.2811	2438.93921	144.58871	7.5254
2	13.217	BB	0.3274	2.99706e4	1418.99475	92.4746



```

NAME      new100M
EXPNO    90
PROCNO   1
Date_    20200531
Time     17.46 h
INSTRUM  Avance
PROBHD   Z116098_0861 f
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        0
DS        0
SWH       5555.556 Hz
FIDRES    0.169562 Hz
AQ         3.898352 sec
RG         101
DM         90.000 usec
DE         3.46 usec
TE         296.3 K
D1         1.00000000 sec
TD0        400.1321647 MHz
SFO1       1H
PC         3.50 usec
P1         10.50 usec
SI         65536
SF         400.1300883 MHz
NAME      RM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00

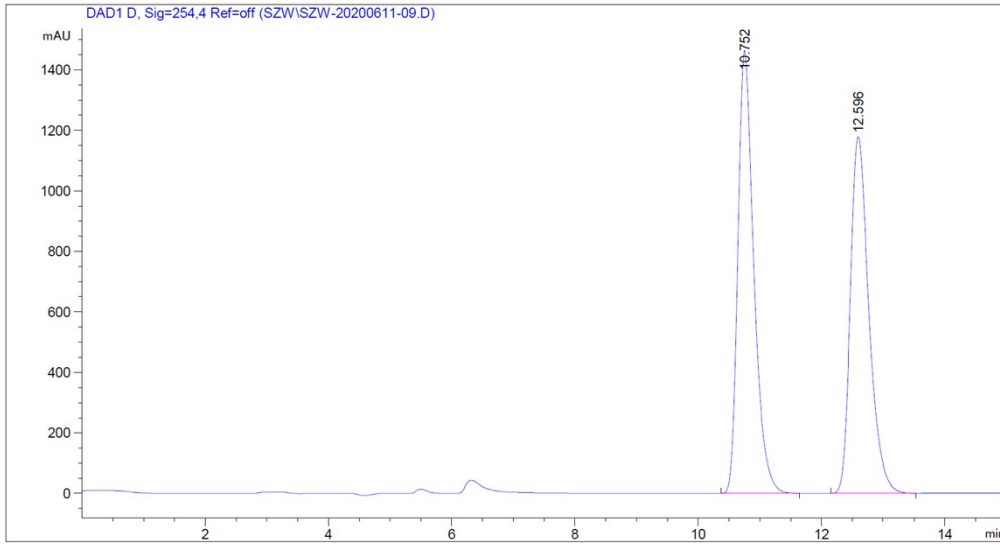
```



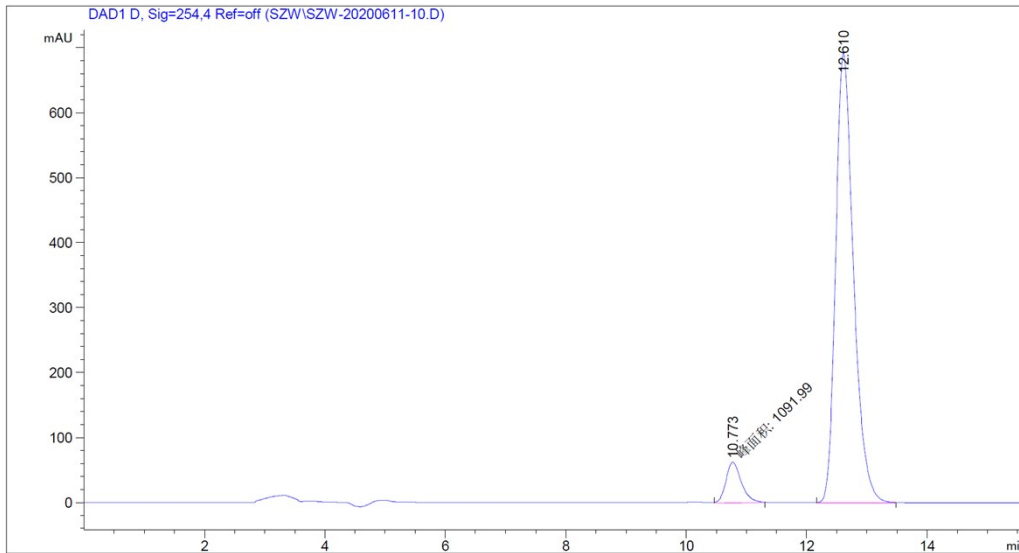
```

NAME      new100M
EXPNO    91
PROCNO   1
Date_    20200531
Time     18.15 h
INSTRUM  Avance
PROBHD   Z116098_0861 f
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        0
DS        0
SWH       25000.000 Hz
FIDRES    0.762939 Hz
AQ         1.3107700 sec
RG         101
DM         20.000 usec
DE         6.50 usec
TE         297.3 K
D1         2.00000000 sec
D11        0.03000000 sec
TD0        100.6238359 MHz
SFO1       13C
PC         3.17 usec
P1         9.50 usec
SI         32768
SF         100.6127685 MHz
NAME      RM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40

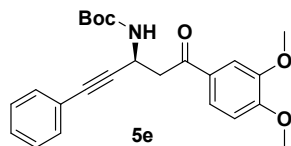
```



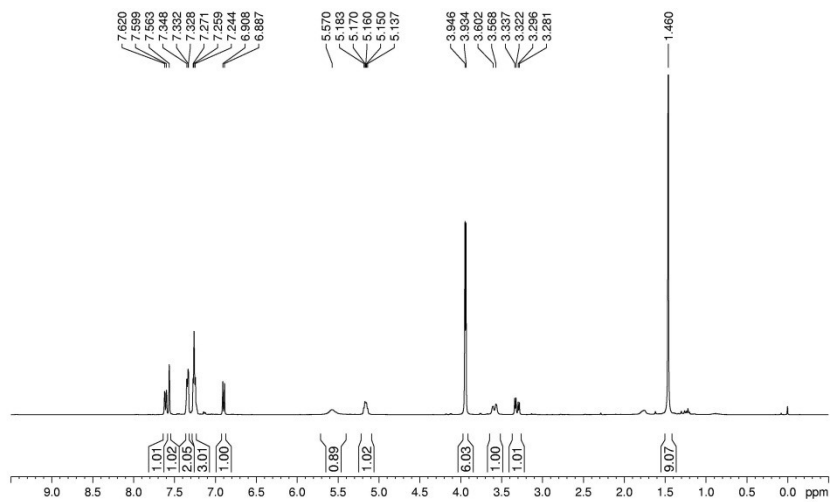
峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.752	BB	0.2739	2.63361e4	1463.88379	51.7435
2	12.596	BB	0.3191	2.45613e4	1178.59119	48.2565



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.773	MM	0.2918	1091.99036	62.36420	7.1291
2	12.610	BB	0.3137	1.42253e4	692.42432	92.8709

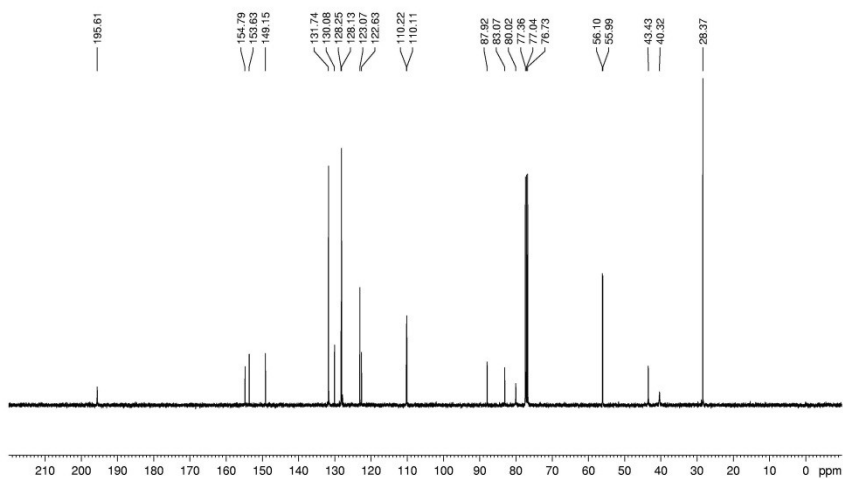


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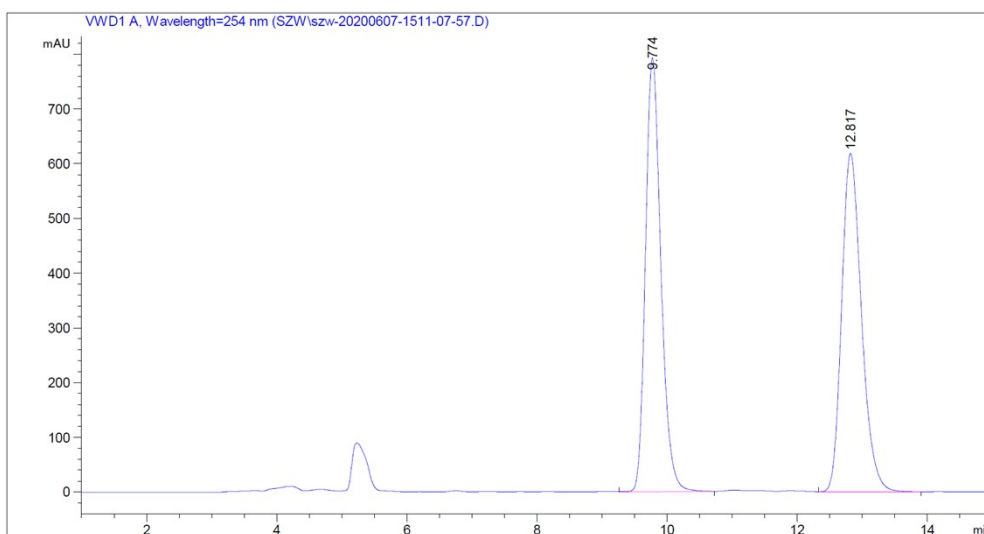
```

NAME      new400M
EXPNO    41
PROCNO   1
Date_    20200524
Time     11.58 h
INSTRUM  Avance
PROBHD   ZH16098_0861 1
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       5555.554 Hz
F2DRHS   0.136942 Hz
AQ        5.8982902 sec
RG        67.4678
DE        90.000 usec
TE        300.6 K
D1        1.00000000 sec
TD0
SFO1     400.1321847 MHz
NUC1      13C
PC        3.50 usec
PT        15.00 usec
SI        60534
SF        400.1300045 MHz
WVW       RM
LB        0.30 Hz
GB        0
PC        1.00
  
```

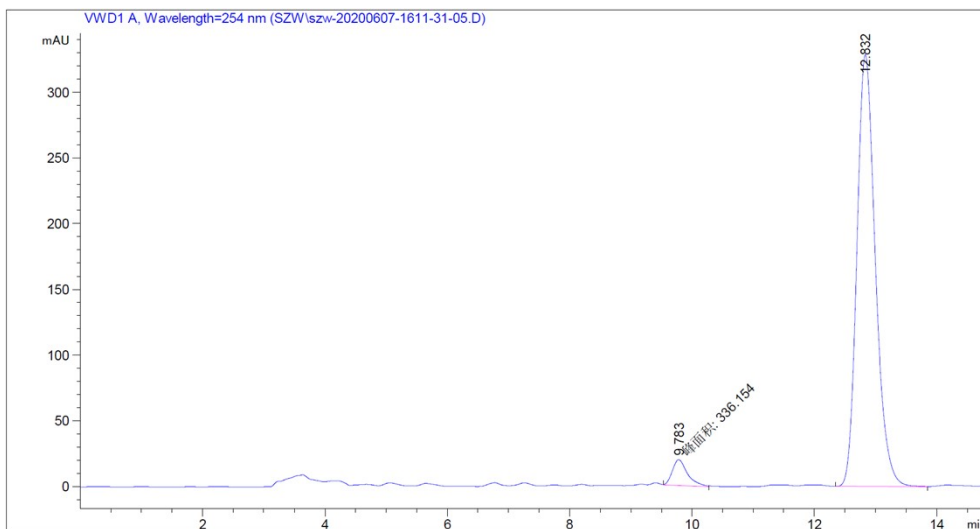


```

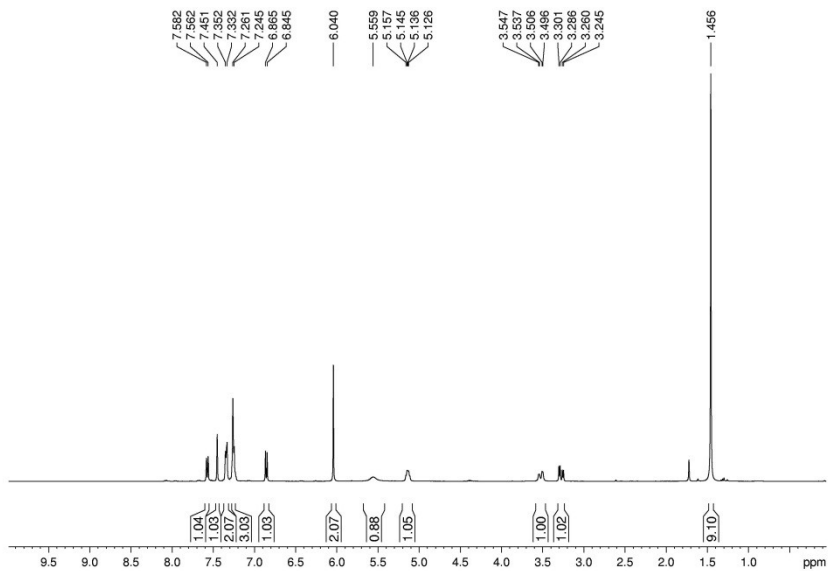
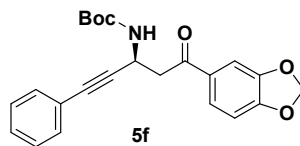
NAME      new400M
EXPNO    41
PROCNO   1
Date_    20200524
Time     12.28 h
INSTRUM  Avance
PROBHD   ZH16098_0861 4
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       25000.000 Hz
F2DRHS   0.142939 Hz
AQ        1.1107970 sec
RG        63.9781
DE        70.000 usec
TE        300.6 K
D1        2.00000000 sec
D11       0.02000000 sec
TD0
SFO1     100.6238353 MHz
NUC1      13C
PC        3.50 usec
PT        9.50 usec
SI        28768
SF        100.6127683 MHz
WVW       RM
LB        1.00 Hz
GB        0
PC        1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.774	BB	0.2528	1.30332e4	792.63934	49.9583
2	12.817	BB	0.3253	1.30550e4	618.39783	50.0417

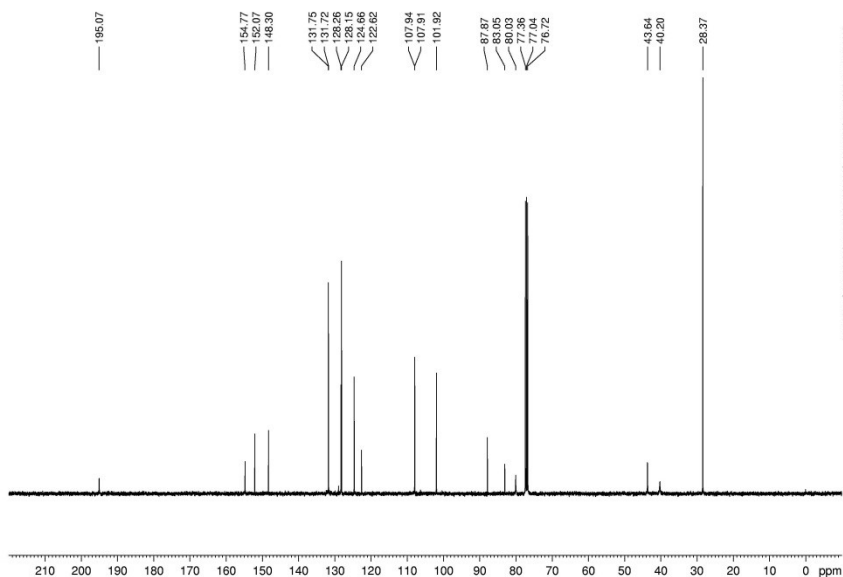


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.783	MM	0.2837	336.15430	19.74664	4.6679
2	12.832	BB	0.3209	6865.21777	328.38739	95.3321



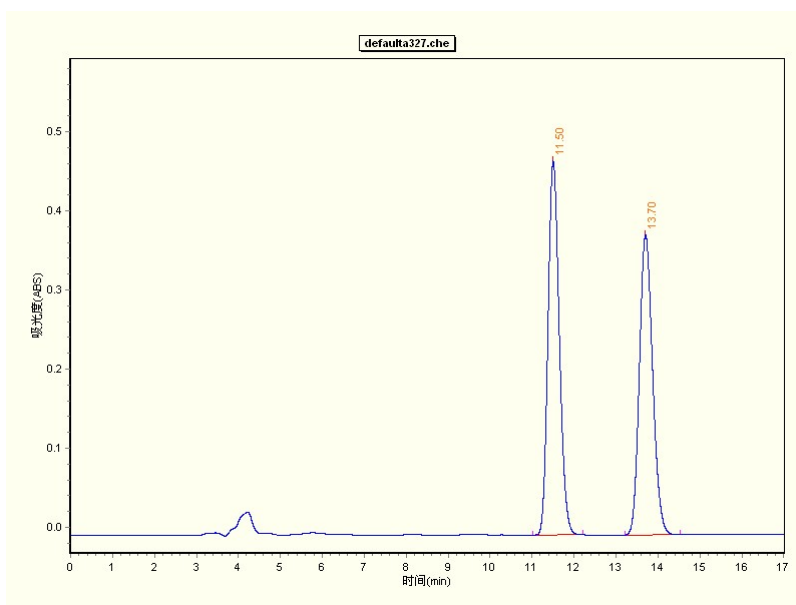
```

NAME      new400M
EXPNO     1
PROCNO    1
Date_     20200614
Time      3.37 h
INSTRUM   Avance
PROBHD    Z116098_081
PULPROG   zg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        555.556 Hz
FIDRES     0.189502 Hz
AQ         5.8982902 sec
RG         101
DE         90.000 usec
TE         297.1 K
TD0        1.0000000 sec
SFO1       400.1321847 MHz
NUC1       1H
PD         3.50 usec
PI         10.30 usec
SI         65536
SF         400.1300000 MHz
WFM        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

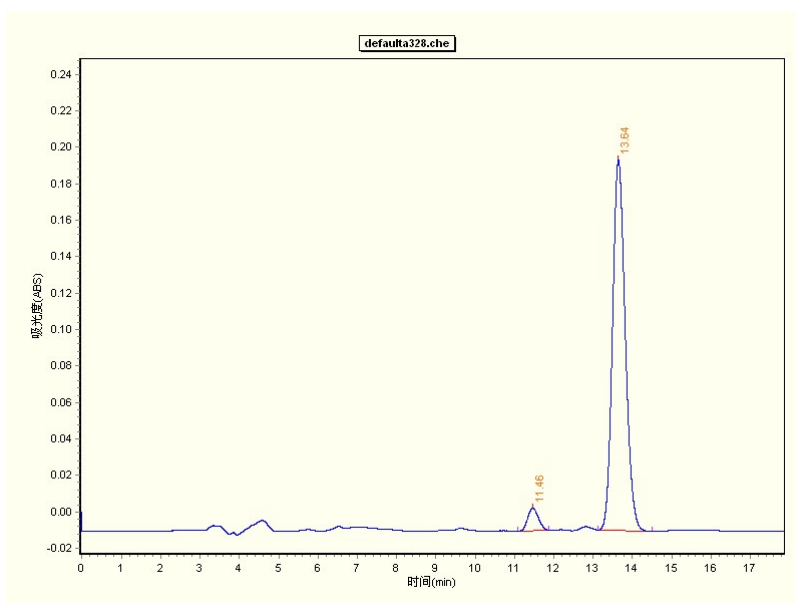


```

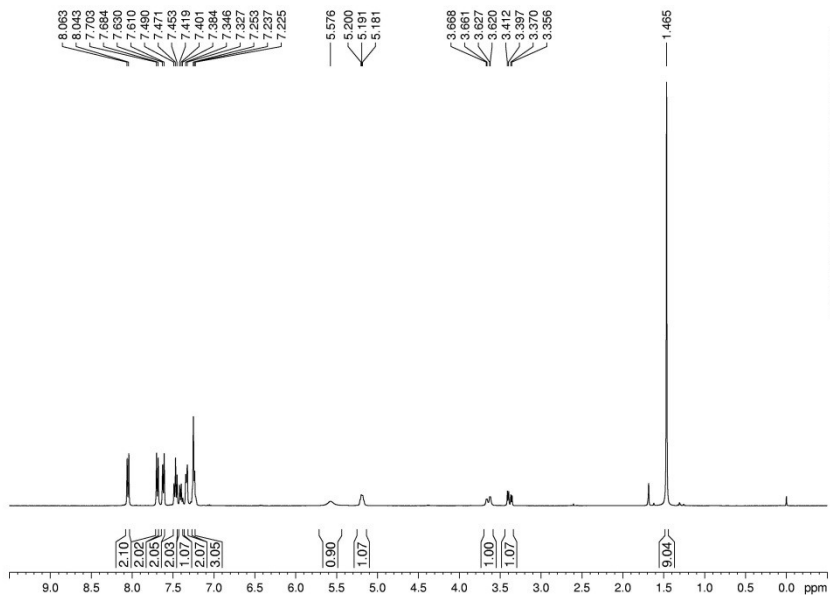
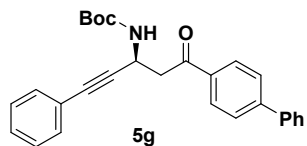
NAME      new400M
EXPNO     121
PROCNO    1
Date_     20200614
Time      4.06 h
INSTRUM   Avance
PROBHD    Z116098_081
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         0
SWH        25000.000 Hz
FIDRES     0.762939 Hz
AQ         1.3107700 sec
RG         25.3858
DE         20.000 usec
TE         297.4 K
TD0        2.0000000 sec
D11        0.03000000 sec
SFO1       100.6238359 MHz
NUC1       13C
PD         3.17 usec
PI         3.50 usec
SI         32768
SF         100.6127685 MHz
WFM        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	11.50	4407445	236251	51.46%	1.198	BB
2	13.70	5157708	189784	48.54%	1.315	BB

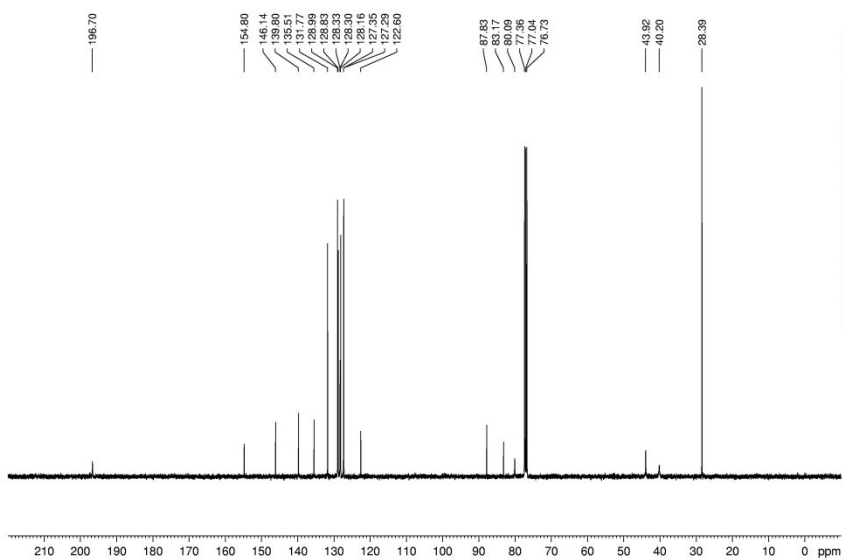


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.46	117245	6192	4.89%	0.788	BB
2	13.64	2280830	101549	95.11%	1.362	BB



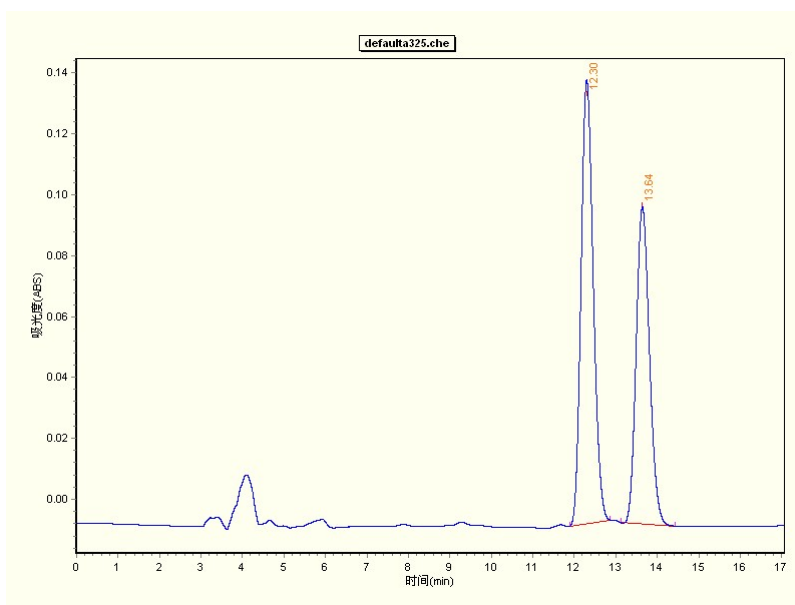
```

NAME      new400M
EXPNO     116
PROCNO    1
Date_     20200614
Time      2.27 h
INSTRUM   Avance
PROBHD    Z116098_0861 (
PULPROG   zgpg
TD         65536
SOLVENT   CDCl3
NS         8
DS         0
SWH        5555.596 Hz
FIDRES    0.169542 Hz
AQ         5.892302 sec
RG         101
SW         90.000 usec
DE         9.46 usec
TE         297.3 K
D1         1.0000000 sec
D11        1
TD0        1
SFO1       400.1321847 MHz
NUC1       13C
PC         3.50 usec
P1         10.50 usec
SI         65536
SF         400.130123 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

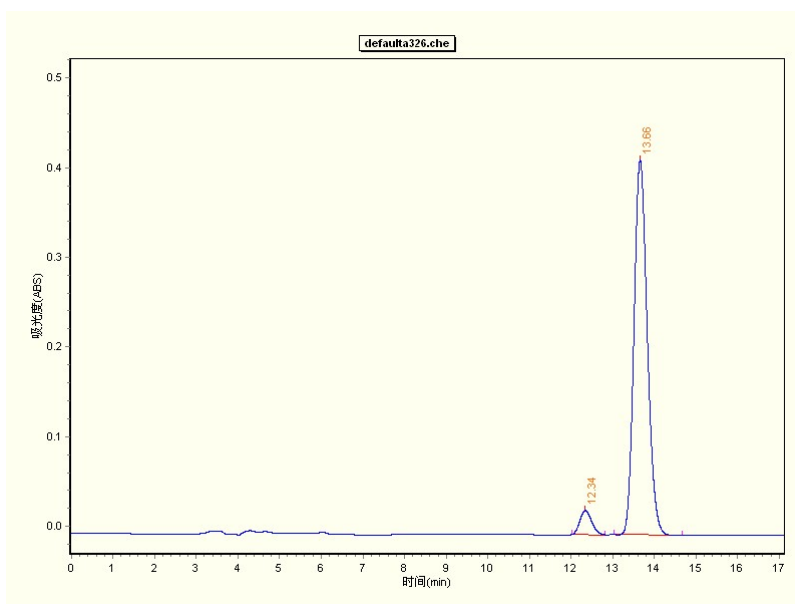


```

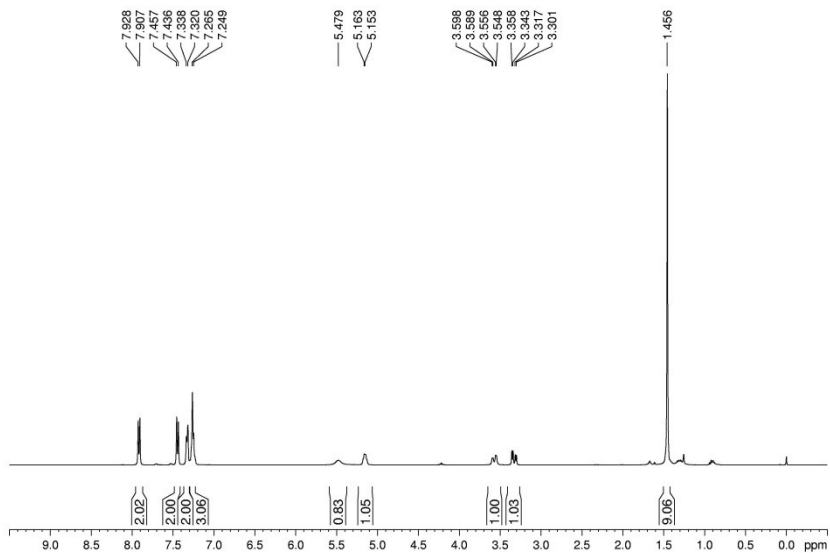
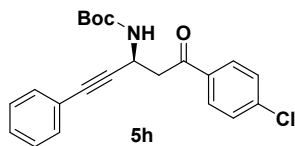
NAME      new400M
EXPNO     117
PROCNO    1
Date_     20200614
Time      2.57 h
INSTRUM   Avance
PROBHD    Z116098_0861 (
PULPROG   zgpg
TD         65536
SOLVENT   CDCl3
NS         8
DS         0
SWH        25000.000 Hz
FIDRES    0.762939 Hz
AQ         1.310709 sec
RG         38.9142
SW         20.000 usec
DE         4.50 usec
TE         297.3 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
SFO1       100.6238353 MHz
NUC1       13C
PC         3.17 usec
P1         4.50 usec
SI         32768
SF         100.6127685 MHz
WDW        EM
SSB        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	12.30	1482533	72851	56.15%	0.952	BB
2	13.64	1157673	52102	43.85%	1.312	BB

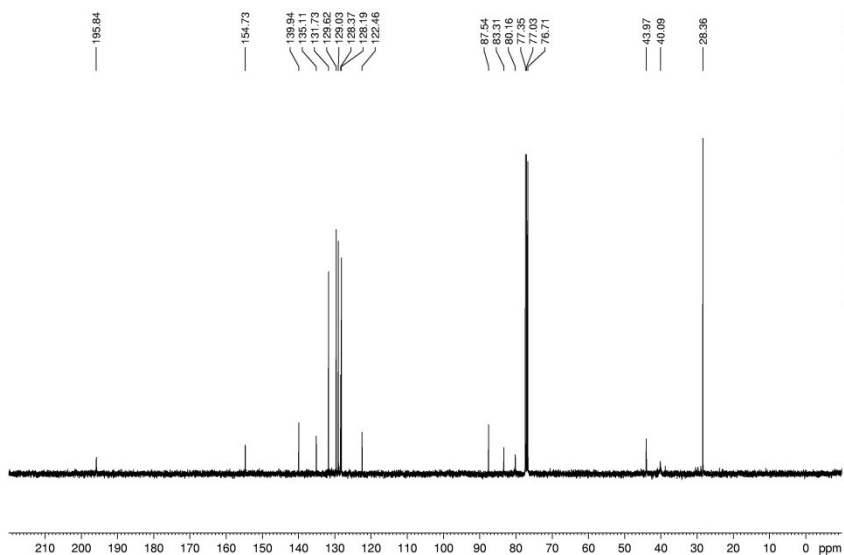


Entry	Retention time	Area	Height	Area%	Width	Type
1	12.34	264984	13501	5.43%	0.806	BB
2	13.66	4619444	208974	94.57%	1.647	BB



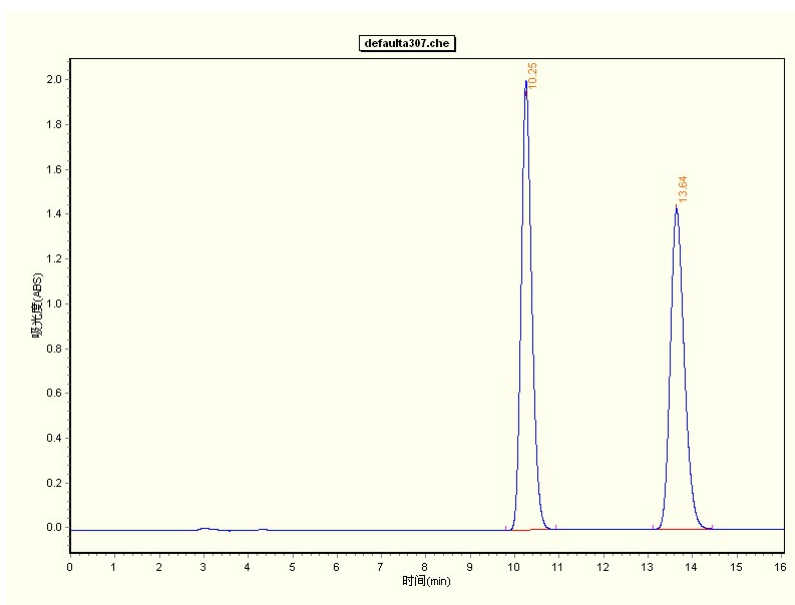
```

NAME          new400M
EXPNO         65
PROCNO        1
Date_         20200910
Time          19.15 h
INSTRUM       Avance
PROBHD        2116098_0861 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           5555.556 Hz
FIDRES        0.169842 Hz
AQ            5.4982902 sec
RG            101
CW            90.000 usec
DE            9.46 usec
TE            298.4 K
D1            1.0000000 sec
TD0           16
SFO1          400.1321847 MHz
NUC1          13C
PC            3.50 usec
P1            10.50 usec
SI            65536
SF            400.1300886 MHz
RGW           256
SBB           0
LB            0.15 Hz
GB            0
PC            1.00
  
```

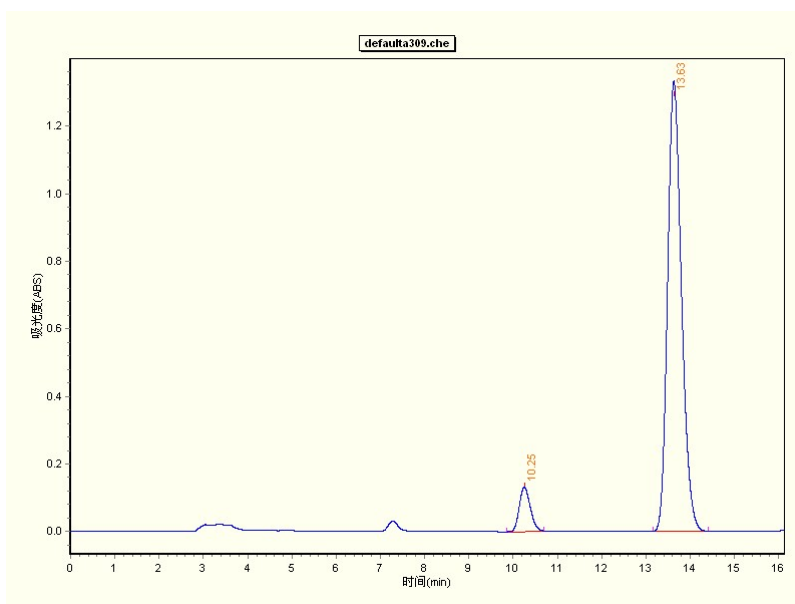


```

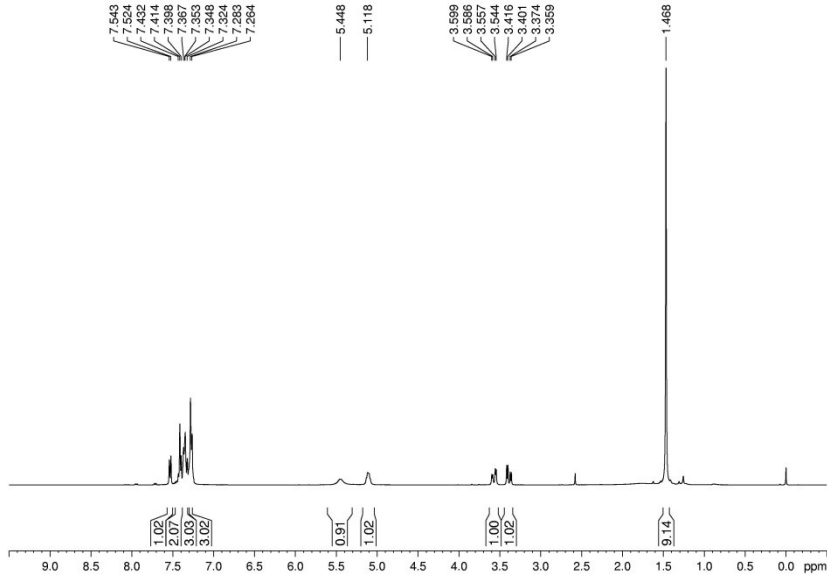
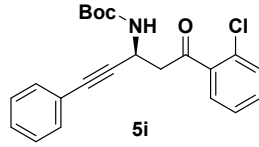
NAME          new400M
EXPNO         66
PROCNO        1
Date_         20200910
Time          19.27 h
INSTRUM       Avance
PROBHD        2116098_0861 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            196
DS            0
SWH           25000.000 Hz
FIDRES        0.762939 Hz
AQ            1.2107709 sec
RG            60.5508
CW            20.000 usec
DE            6.43 usec
TE            298.4 K
D1            2.0000000 sec
D11           0.0300000 sec
TD0           16
SFO1          100.6238359 MHz
NUC1          13C
PC            3.11 usec
P1            9.50 usec
SI            32768
SF            100.6127685 MHz
RGW           256
SBB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	10.25	16498018	1001743	51.42%	1.131	BB
2	13.64	15587914	714414	48.58%	1.322	BB

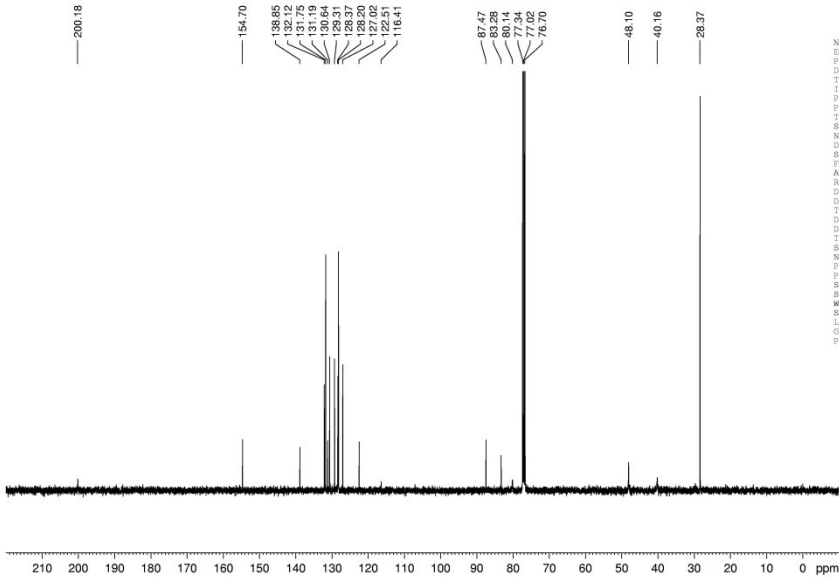


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.25	1124474	65396	7.19%	0.845	BB
2	13.63	14516191	666244	92.81%	1.248	BB



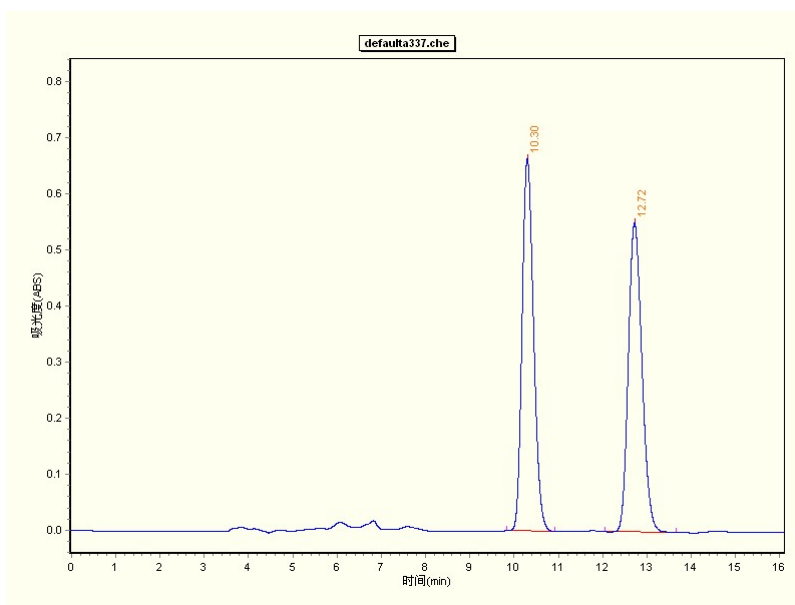
```

NAME          new400M
EXPNO         136
PROCNO        1
Date_         20200626
Time          22.50 h
INSTRUM       Avance
PROBHD        z116098_0961 (
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           3658.336 Hz
FIDRES        0.169562 Hz
AQ           5.8982902 sec
RG            101
DM           99.000 usec
DE           3.46 usec
TE           297.8 K
D1           1.0000000 sec
TD0          1
SFO1          400.1321847 MHz
NUC1          1H
P0            3.50 usec
P1            10.50 usec
S1            65536
SF            400.1300887 MHz
WDM          DM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

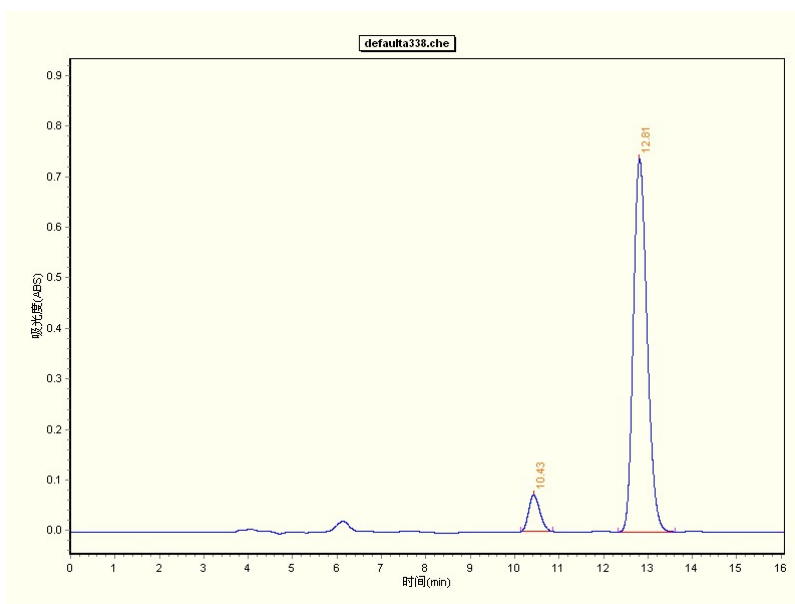


```

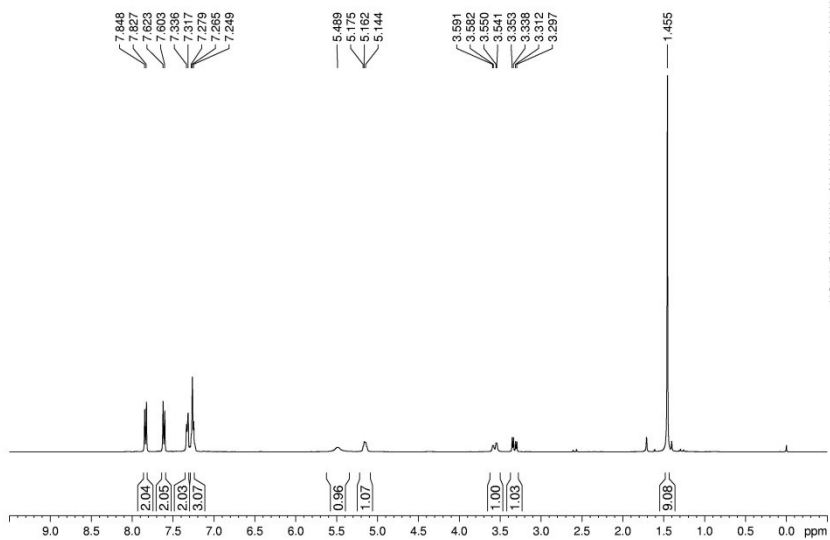
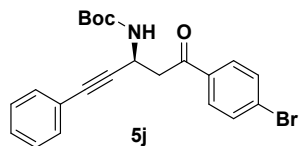
NAME          new400M
EXPNO         137
PROCNO        1
Date_         20200626
Time          23.20 h
INSTRUM       Avance
PROBHD        z116098_0961 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            12
DS            0
SWH           25000.000 Hz
FIDRES        0.762939 Hz
AQ           1.3107000 sec
RG            62.2808
DM           20.000 usec
DE           6.50 usec
TE           298.2 K
D1           2.0000000 sec
D11          0.0300000 sec
TD0          1
SFO1          100.6238359 MHz
NUC1          13C
P0            3.17 usec
P1            9.50 usec
S1            32768
SF            100.6127685 MHz
WDM          DM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	10.30	5969244	332100	50.35%	1.087	BB
2	12.72	5885112	275760	49.65%	1.613	BB

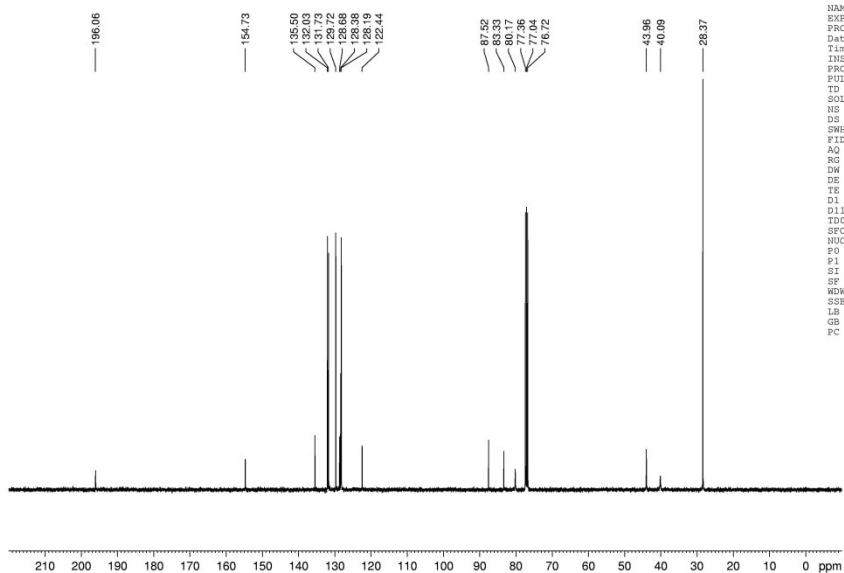


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.43	637183	36213	7.45%	0.733	BB
2	12.81	7919595	369378	92.55%	1.274	BB



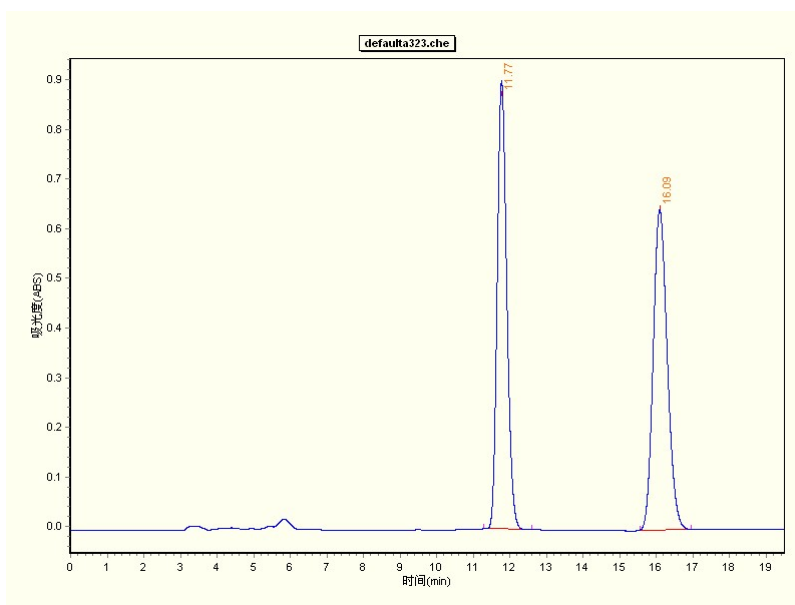
```

NAME          new4004
EXPNO         114
PROCNO        1
Date_         20200614
Time          1.53 h
INSTRUM       Avance
PROBHD        2116098_0861 (
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            0
DS            0
SWH           5555.556 Hz
FIDRES        0.149542 Hz
AQ            5.8982902 sec
RG            97.9624
DW            90.000 usec
DE            9.46 usec
TE            297.3 K
D1            1.00000000 sec
TDO           0
SFO1          400.1321847 MHz
NUC1          1H
FO            3.50 usec
P1            10.50 usec
SI            65536
SF            400.1300084 MHz
WDFW         EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

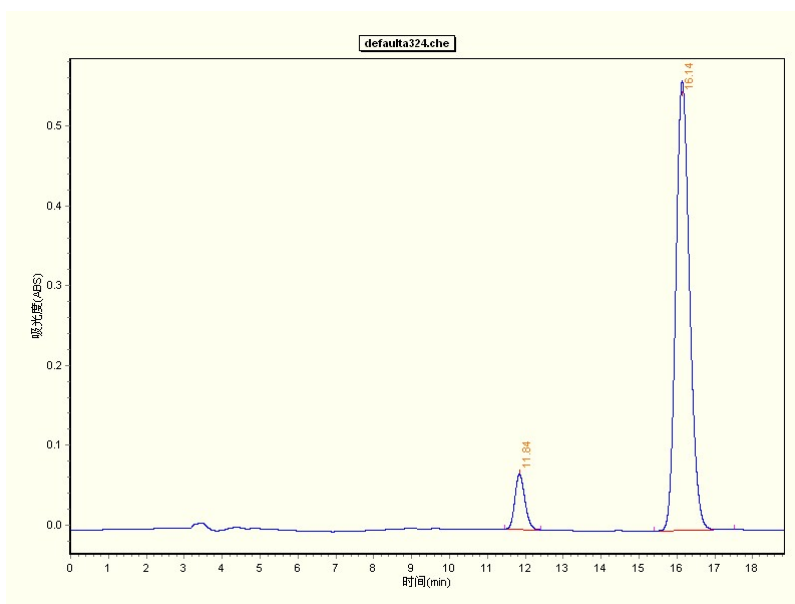


```

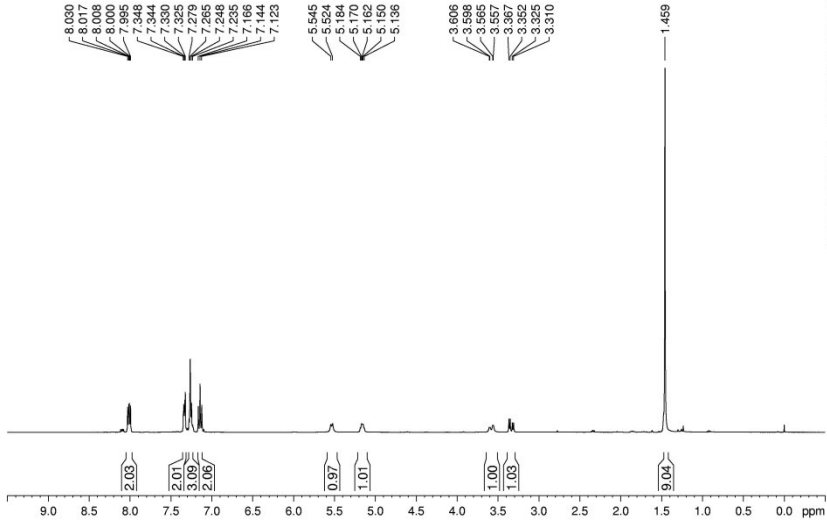
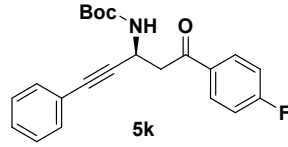
NAME          new4004
EXPNO         115
PROCNO        1
Date_         20200614
Time          2.23 h
INSTRUM       Avance
PROBHD        2116098_0861 (
PULPROG       zpg30
TD            65536
SOLVENT       CDCl3
NS            0
DS            0
SWH           25000.000 Hz
FIDRES        0.762939 Hz
AQ            1.3107700 sec
RG            52.1668
DW            20.600 usec
DE            6.50 usec
TE            297.8 K
D1            2.00000000 sec
D11           0.03000000 sec
TDO           1
SFO1          100.6238359 MHz
NUC1          13C
FO            3.17 usec
P1            9.50 usec
SI            32768
SF            100.6127668 MHz
WDFW         EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	11.77	8194744	451458	48.74%	1.314	BB
2	16.09	8616793	322796	51.26%	1.392	BB



Entry	Retention time	Area	Height	Area%	Width	Type
1	11.84	629136	34687	8.13%	0.934	BB
2	16.14	7106141	281441	91.87%	2.110	BB



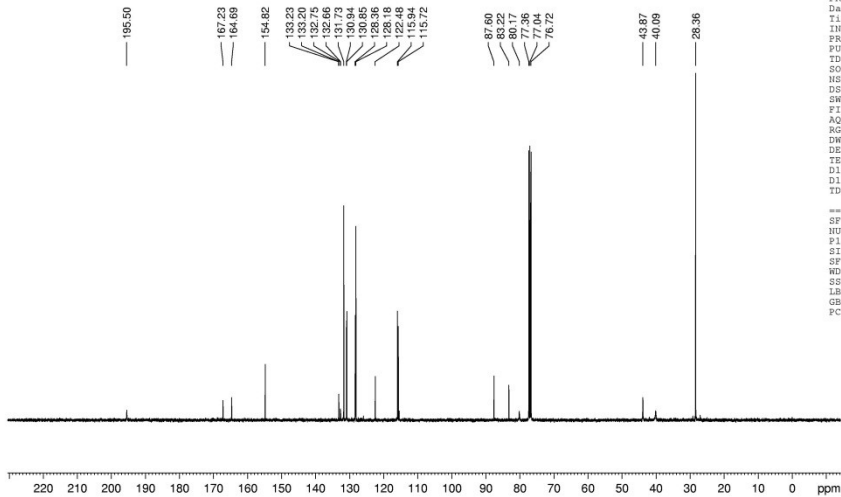
```

NAME      old400M
EXPNO    212
PROCNO   1
Date_    20210409
Time     21.18
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zg30
TD        65536
SOLVENT  CDCl3
NS        8
DS        0
SWH       8012.820 Hz
FIDRES   0.122266 Hz
AQ        4.088486 sec
RG        52.37
DW        62.400 usec
DE        6.50 usec
TE        295.5 K
D1        1.0000000 sec
TD0       1
  
```

----- CHANNEL f1 -----

```

SF01     400.152208 MHz
NUC1      1H
P1       10.75 usec
SI       65536
SF       400.1500000 MHz
WDW      EM
SSB      0
LB       0.30 Hz
GB       0
PC       1.00
  
```



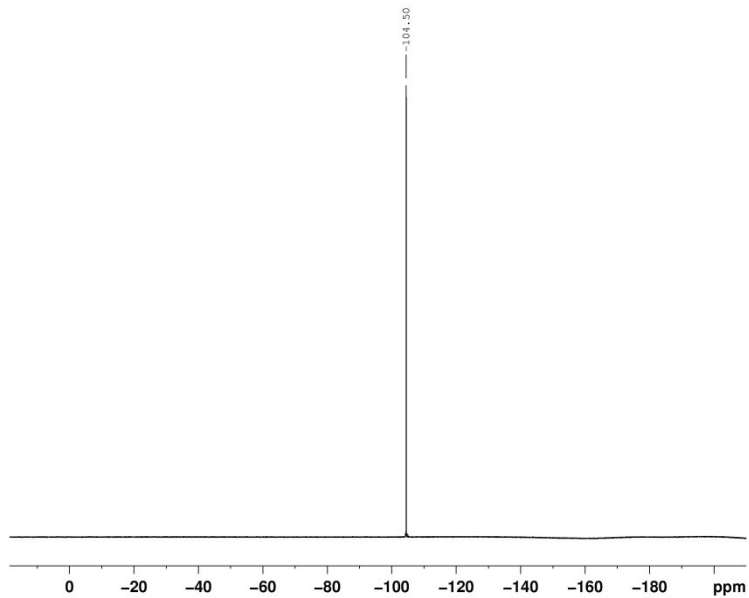
```

NAME      old400M
EXPNO    213
PROCNO   1
Date_    20210409
Time     21.58
INSTRUM  spect
PROBHD   5 mm PABBO BB/
PULPROG  zgpg30
TD        65536
SOLVENT  CDCl3
NS        700
DS        0
SWH       25252.525 Hz
FIDRES   0.385323 Hz
AQ        1.2976629 sec
RG        195.85
DW        19.800 usec
DE        6.50 usec
TE        296.0 K
D1        2.0000000 sec
D11      0.03000000 sec
TD0       1
  
```

----- CHANNEL f1 -----

```

SF01     100.6283629 MHz
NUC1     13C
P1       10.50 usec
SI       32768
SF       100.6177980 MHz
WDW      EM
SSB      0
LB       1.00 Hz
GB       0
PC       1.40
  
```

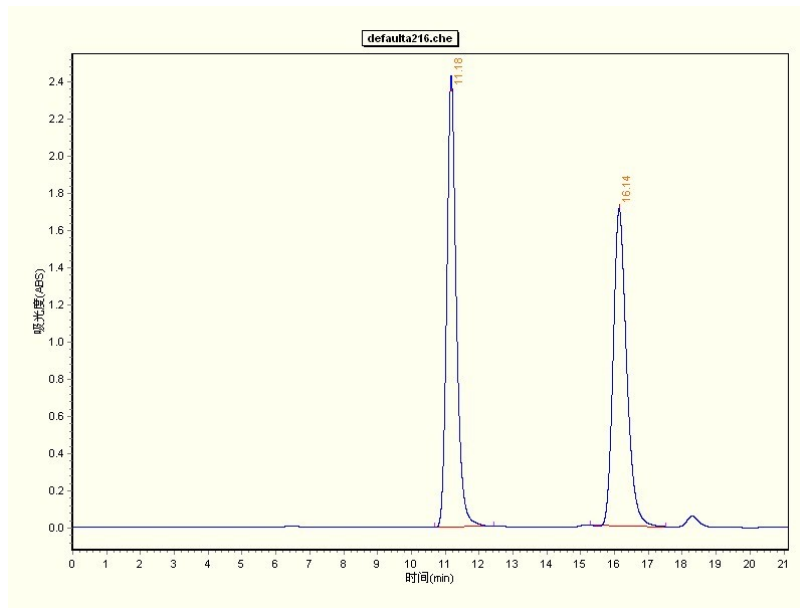


```

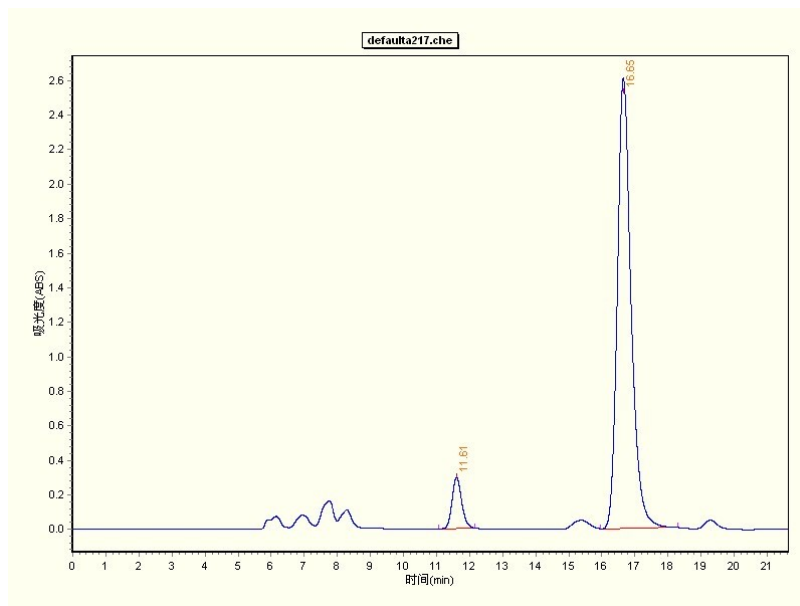
NAME          old400M
EXPNO         214
PROCNO        1
Date_         20210409
Time          22.00
INSTRUM       spect
PROBHD        5 mm PABBO BB/
PULPROG       zgpg30q.2
ID            131072
SOLVENT       CDCl3
NS            16
DS            4
SWH           89285.711 Hz
FIDRES        0.681196 Hz
AQ            0.7346532 sec
RG            195.85
DW            5.600 usec
DE            6.50 usec
TE            295.2 K
D1            1.0000000 sec
D11           0.0300000 sec
D12           0.0002000 sec
TD0           1

===== CHANNEL f1 =====
SF01          376.4795333 MHz
NUC1           19F
P1            14.00 usec
SI            65536
SF            376.5171850 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00

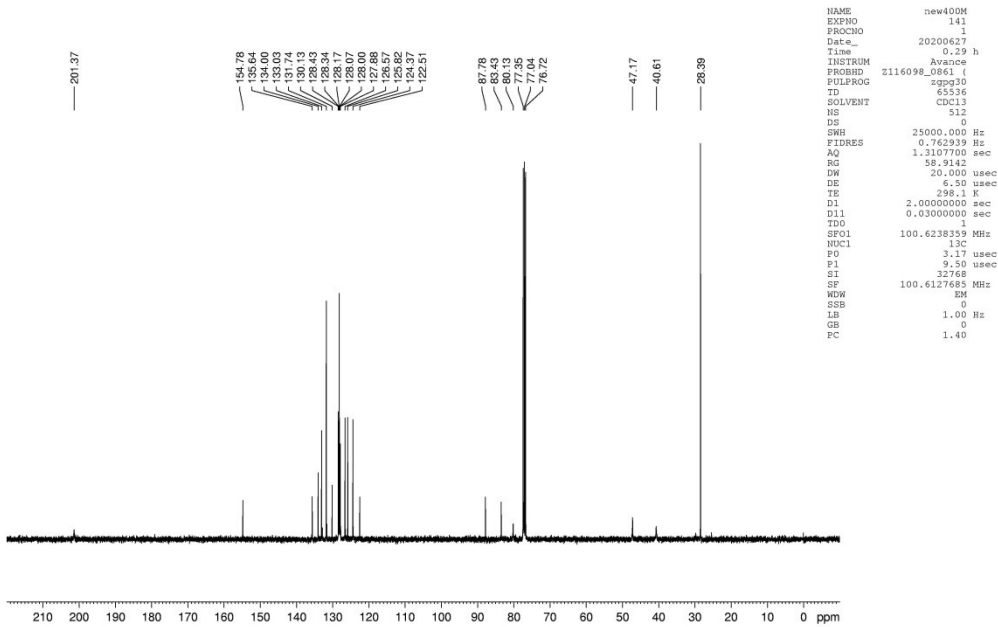
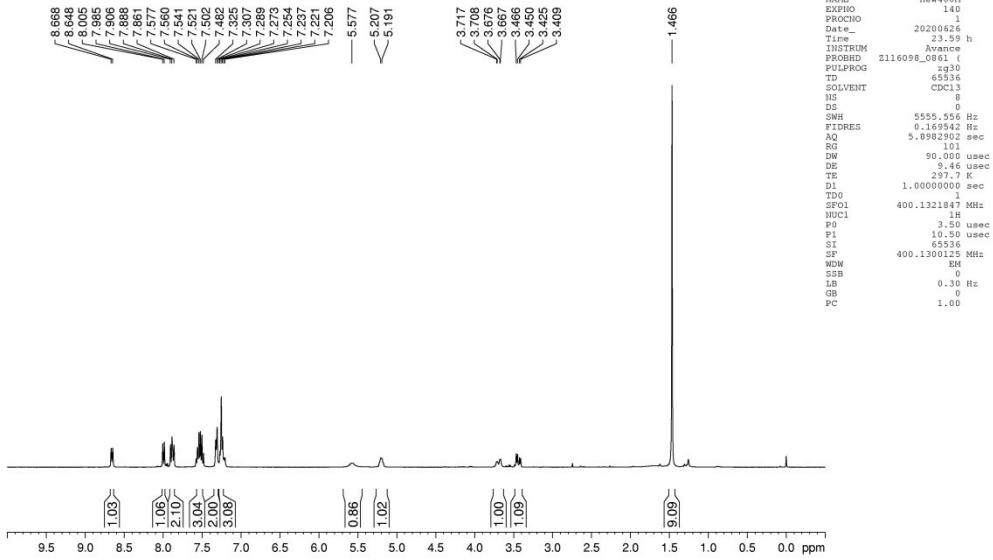
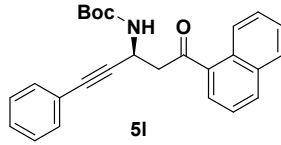
```

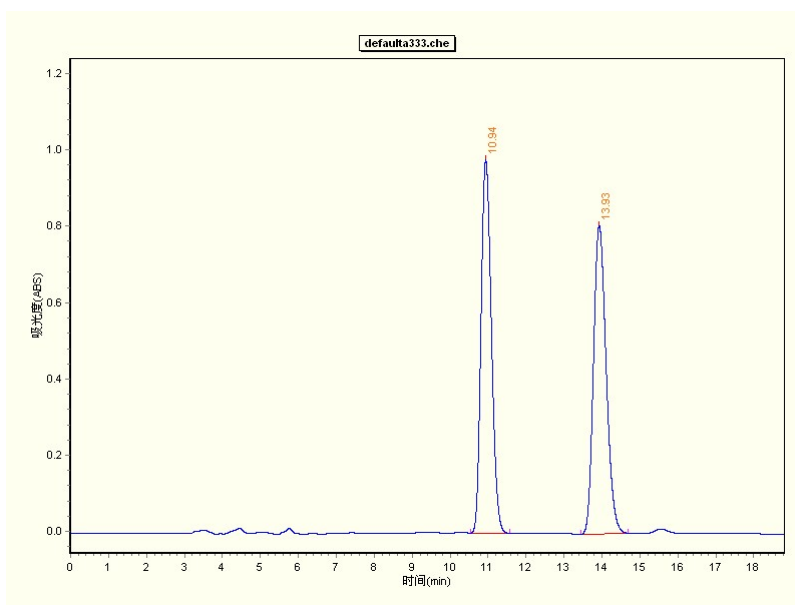


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.18	23795942	1213560	50.40%	1.736	BB
2	16.14	23417333	854675	49.60%	2.221	BB

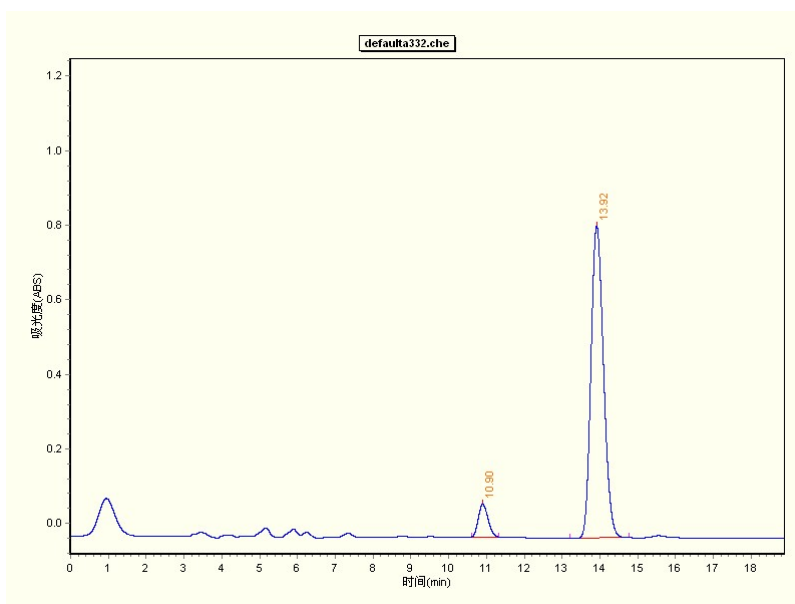


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.61	2983376	147376	7.34%	1.051	BB
2	16.65	37657266	1303029	92.66%	2.338	BB

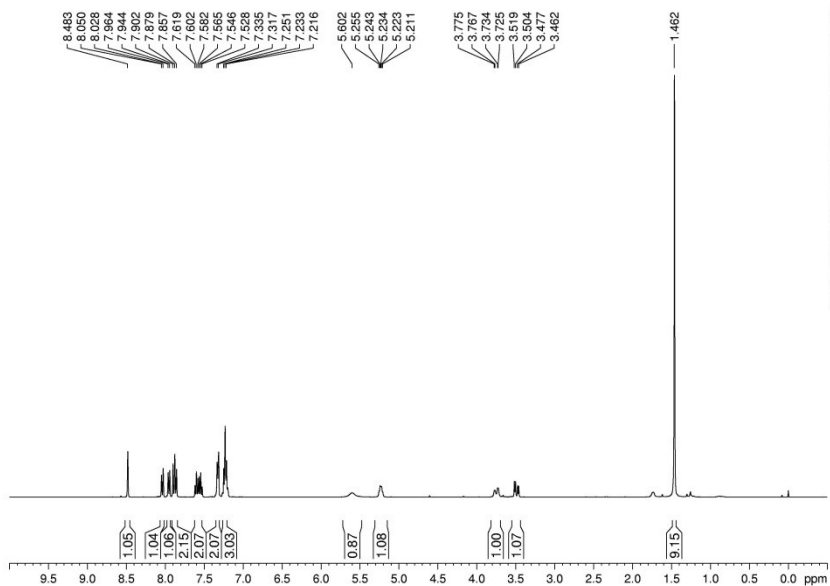
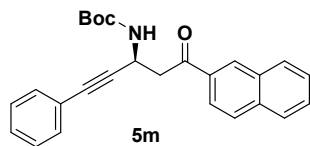




Entry	Retention time	Area	Height	Area%	Width	Type
1	10.94	9241243	488487	49.74%	1.025	BB
2	13.93	9337716	403425	50.26%	1.249	BB

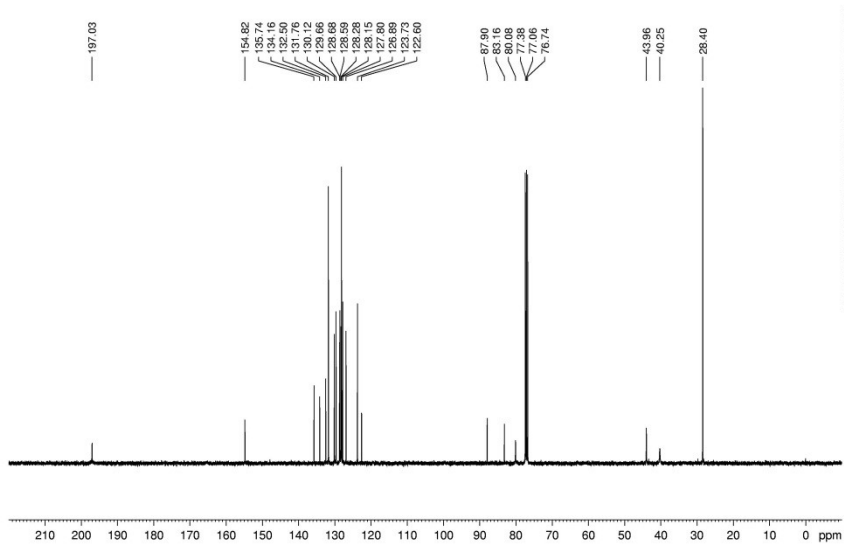


Entry	Retention time	Area	Height	Area%	Width	Type
1	10.90	779989	44019	7.50%	0.720	BB
2	13.92	9620465	418856	92.50%	1.572	BB



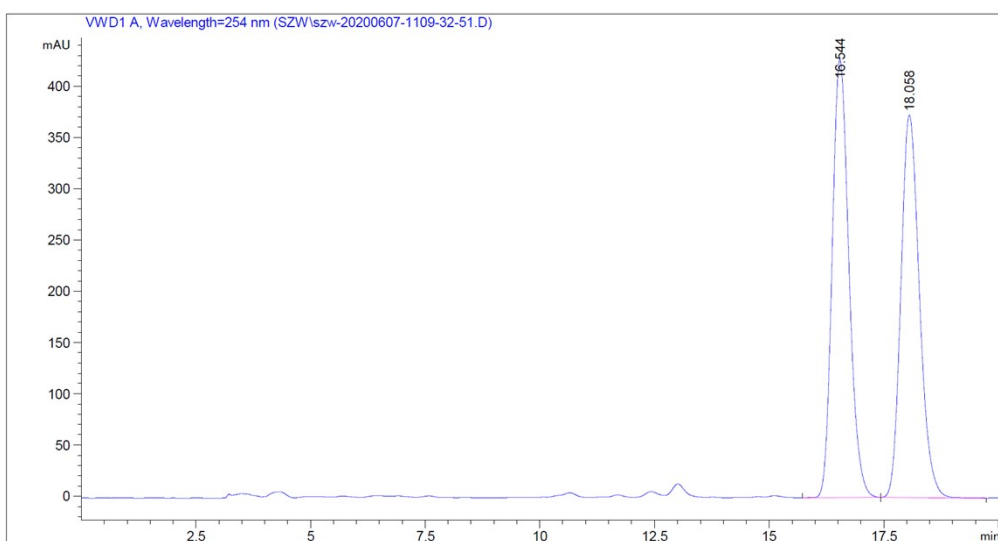
```

NAME      new400M
EXPNO     25
PROCNO    1
Date_     20200524
Time      12.50 h
INSTRUM   Avance
PROBHD    zg30
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         8
DS         0
SWH        5555.556 Hz
FIDRES     0.169542 Hz
AQ         5.8982302 sec
RG         73.4286
DW         30.000 usec
DE         9.46 usec
TE         298.2 K
D1         1.0000000 sec
TD0        1
SFO1       400.1321847 MHz
NUC1       1H
P2         3.50 usec
P1         10.50 usec
ST         63334
SF         400.1308126 MHz
MW         EM
SBS        0
LB         0.30 Hz
GB         0
PC         1.00
  
```

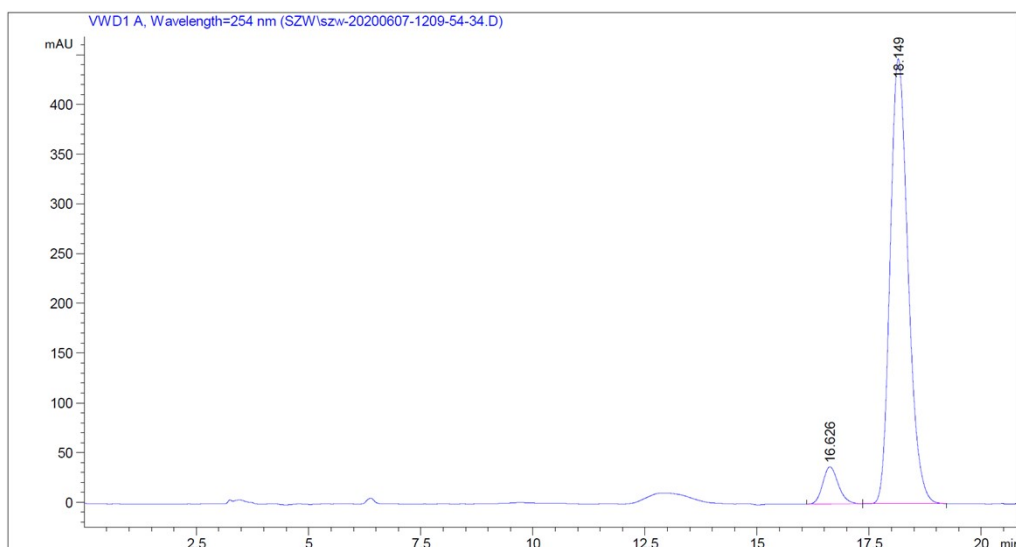


```

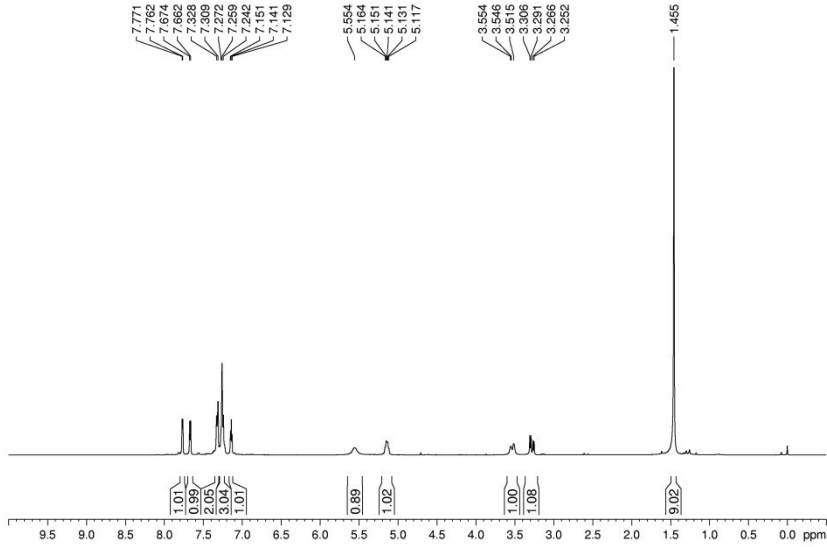
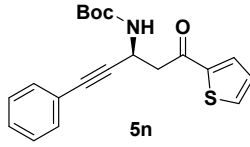
NAME      new400M
EXPNO     86
PROCNO    1
Date_     20200524
Time      16.42 h
INSTRUM   Avance
PROBHD    zgpg30
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         512
DS         0
SWH        25000.000 Hz
FIDRES     0.762939 Hz
AQ         1.3107700 sec
RG         65.3941
DW         20.000 usec
DE         4.50 usec
TE         298.6 K
D1         2.0000000 sec
D11        0.0300000 sec
TD0        1
SFO1       100.6238359 MHz
NUC1       13C
P2         3.111 usec
P1         9.50 usec
ST         32768
SF         100.6127685 MHz
MW         EM
SBS        0
LB         1.00 Hz
GB         0
PC         1.40
  
```



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	16.544	BB	0.3938	1.08346e4	427.31992	50.8633
2	18.058	BB	0.4364	1.04668e4	373.02533	49.1367

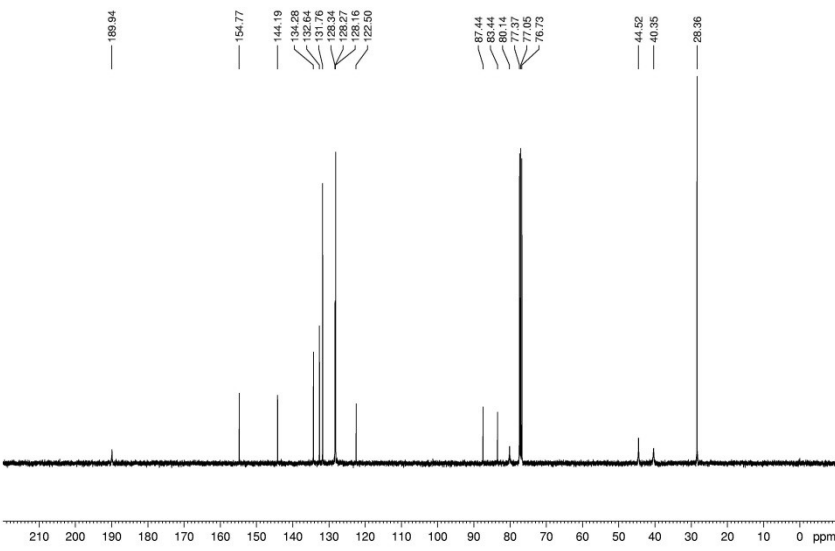


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	16.626	BB	0.3710	899.00726	37.31953	6.7458
2	18.149	BB	0.4301	1.24280e4	447.41180	93.2542



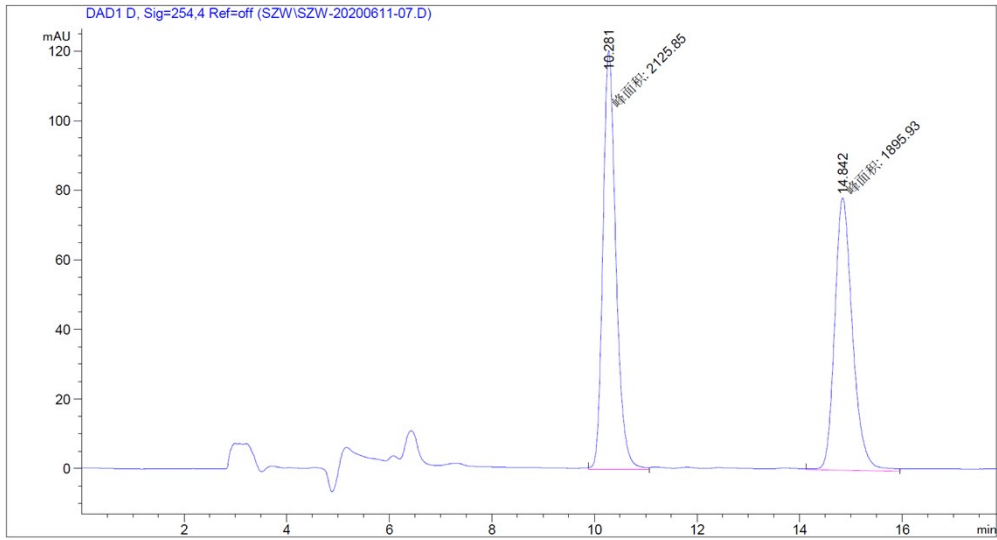
```

NAME      new400M
EXPNO     95
PROCNO    1
Date_     20200531
Time      13:25:33
INSTRUM   Avance
PROBHD    5mmQNP1H
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         4
F2       505.554 MHz
F1       6.141652 Hz
AQ       5.898292 sec
RG        32.021
DM       90.000 usec
DE       6.40 usec
TE       300.2 K
D1       1.00000000 sec
D11      0.03000000 sec
D12      0.03000000 sec
SFO1     400.1321842 MHz
NUC1      13C
PD        1.00 usec
PI        10.50 usec
PT        65536
PC        400.1300000 MHz
SFO2     90.00 MHz
SB        0.30 Hz
GB        0
PC        1.00
  
```

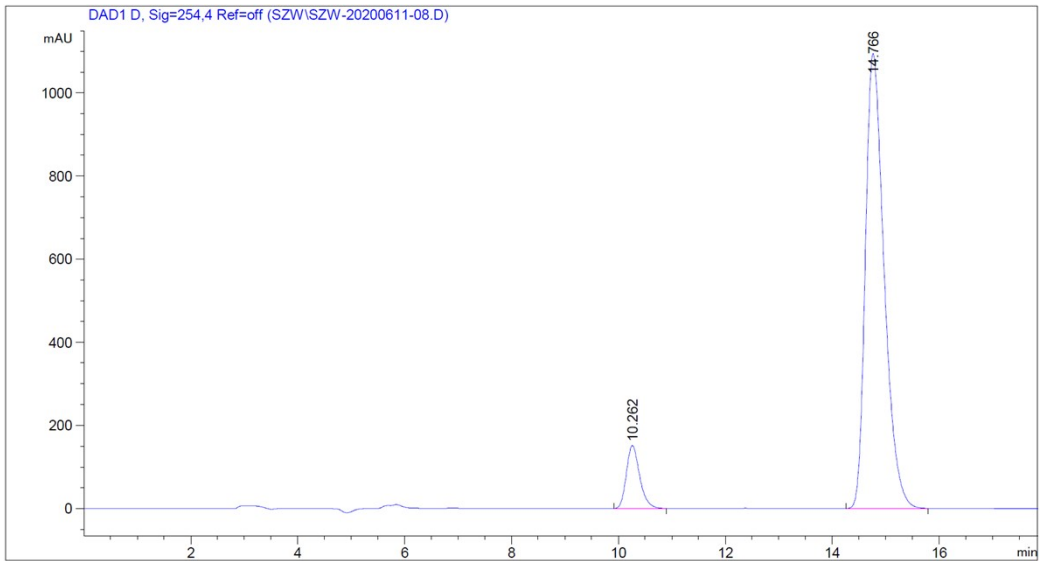


```

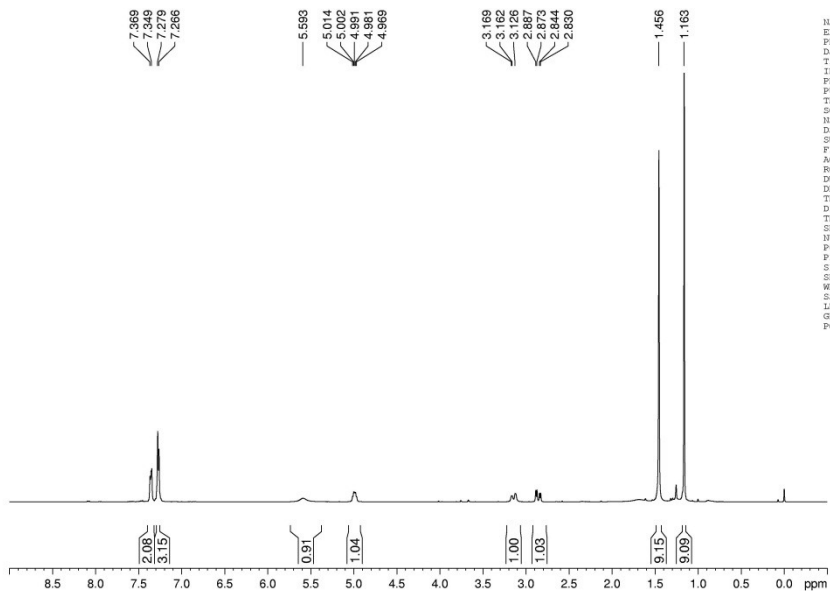
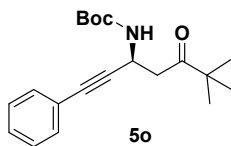
NAME      new400M
EXPNO     1
PROCNO    1
Date_     20200531
Time      13:25:33
INSTRUM   Avance
PROBHD    5mmQNP1H
PULPROG   zgpg30
TD         65536
SOLVENT   CDCl3
NS         0
DS         4
F2       200.000 MHz
F1       0.762939 Hz
AQ       1.5107700 sec
RG        101
DM       20.000 usec
DE       6.40 usec
TE       300.2 K
D1       2.00000000 sec
D11      0.03000000 sec
D12      0.03000000 sec
SFO1     100.6283559 MHz
NUC1      13C
PD        1.00 usec
PI        9.50 usec
PT        65536
PC        100.6127465 MHz
SFO2     90.00 MHz
SB        1.00 Hz
GB        0
PC        1.40
  
```

峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.281	MM	0.2942	2125.84570	120.44689	52.8584
2	14.842	MM	0.4036	1895.92993	78.29681	47.1416

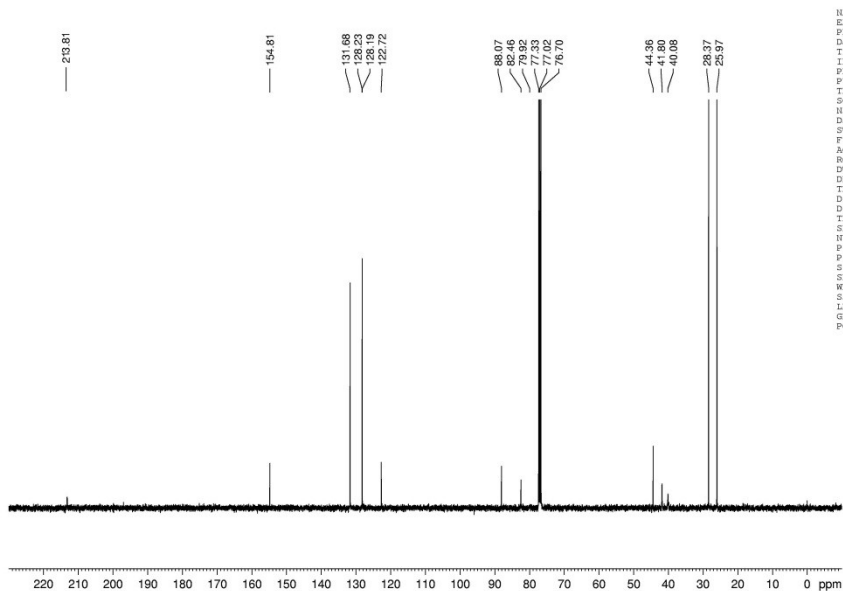


峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.262	BB	0.2663	2629.80298	151.66402	8.9943
2	14.766	BB	0.3735	2.66087e4	1094.88684	91.0057



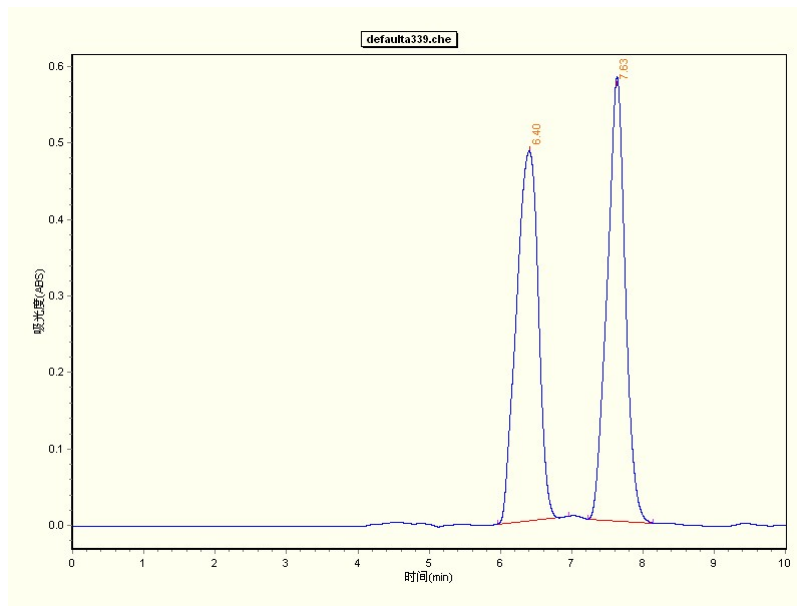
```

NAME          new400M
EXPNO         138
PROCNO        1
Date_         20200626
Time          23.25 h
INSTRUM       Avance
PROBHD        zg30
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            8
DS            0
SWH           5555.596 Hz
FIDRES        0.169542 Hz
AQ            5.8962902 sec
RG            101
DE            9.46 usec
TE            297.8 K
D1            1.0000000 sec
TDO           1
SF01          400.1321847 MHz
NUC1          1H
P0            3.50 usec
P1            10.50 usec
SI            65536
SF            400.1300078 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

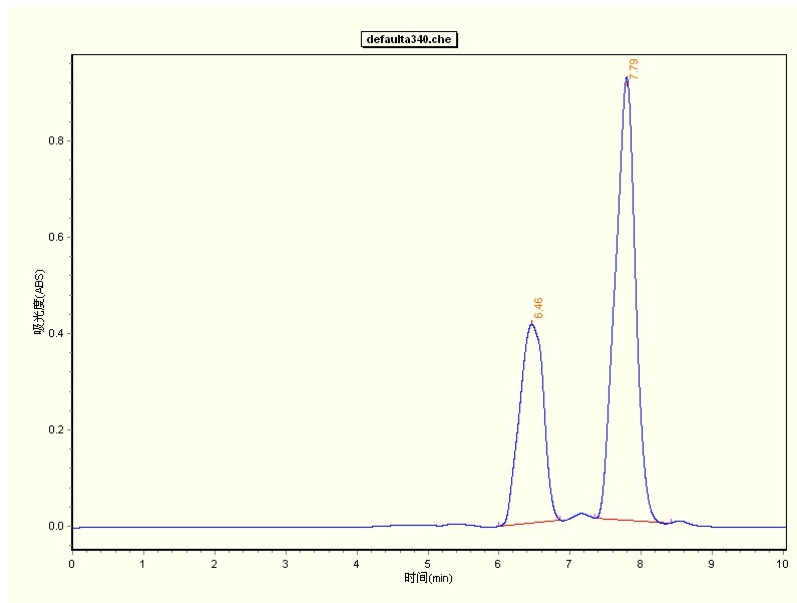


```

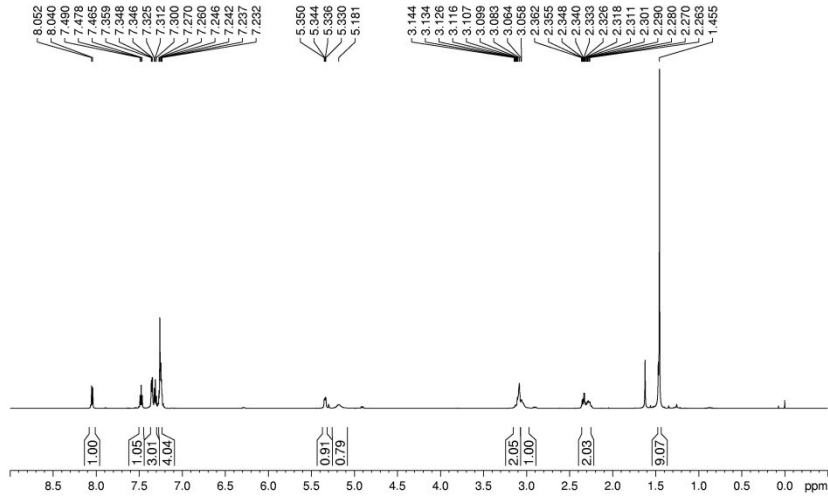
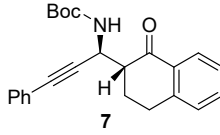
NAME          new400M
EXPNO         139
PROCNO        1
Date_         20200626
Time          23.54 h
INSTRUM       Avance
PROBHD        zgpg30
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            512
DS            0
SWH           25000.000 Hz
FIDRES        0.762339 Hz
AQ            1.3107700 sec
RG            58.8142
DE            20.000 usec
TE            298.2 K
D1            2.0000000 sec
D11           0.0300000 sec
TDO           1
SF01          100.6238359 MHz
NUC1          13C
P0            3.17 usec
P1            9.50 usec
SI            32768
SF            100.6127685 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	6.40	5172611	241789	50.15%	0.992	BB
2	7.63	5142194	290385	49.85%	0.912	BB

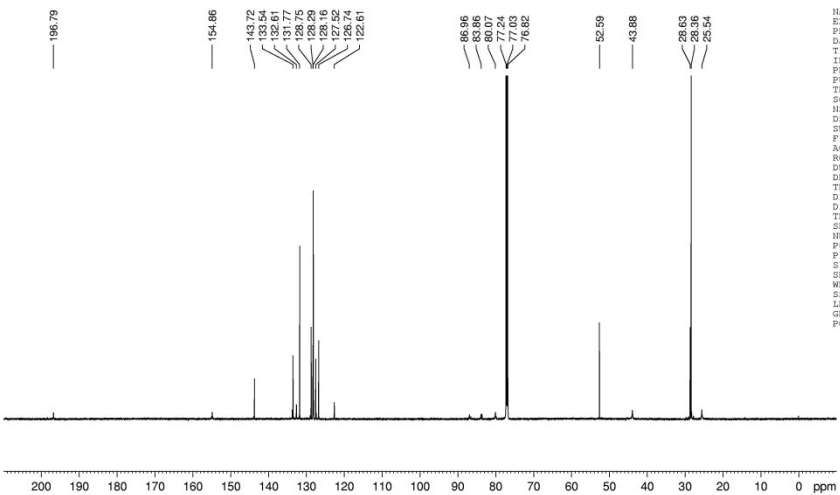


Entry	Retention time	Area	Height	Area%	Width	Type
1	6.46	4824356	206004	34.75%	0.866	BB
2	7.79	9057243	459483	65.25%	1.065	BB



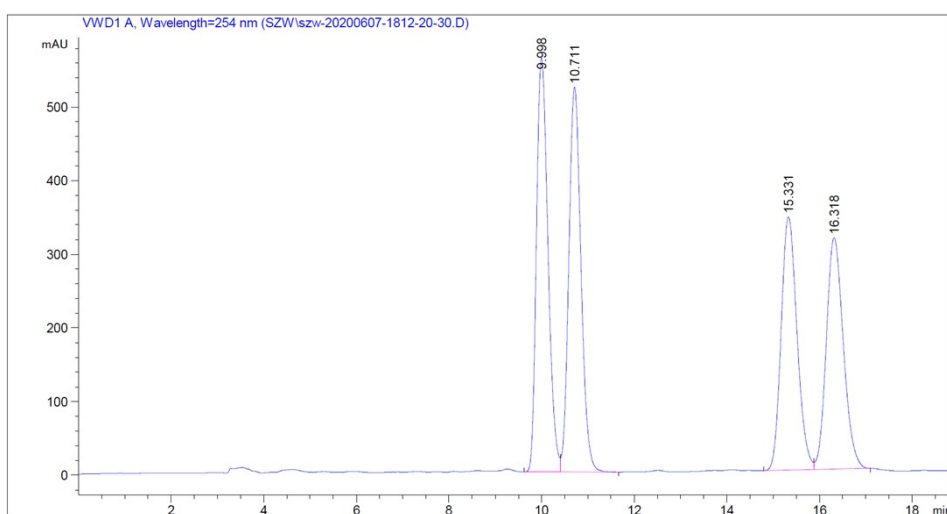
```

NAME          600M
EXPNO         49
PROCNO        1
Date_         20210902
Time          15.29 h
INSTRUM       Avance
PROBHD        zgpg30
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            32
DS            4
SWH           11994.742 Hz
FIDRES        0.363304 Hz
AQ            2.7525628 sec
RG            101
DW            42.000 usec
DE            13.70 usec
TE            298.0 K
D1            1.00000000 sec
D11           0.03000000 sec
TDO           1
SFO1          600.1370960 MHz
NUC1          13C
PQ            4.00 usec
PI            12.00 usec
SI            65536
SF            600.1700140 MHz
WDW           EM
SSB           0
LB            0.30 Hz
GB            0
PC            1.00
  
```

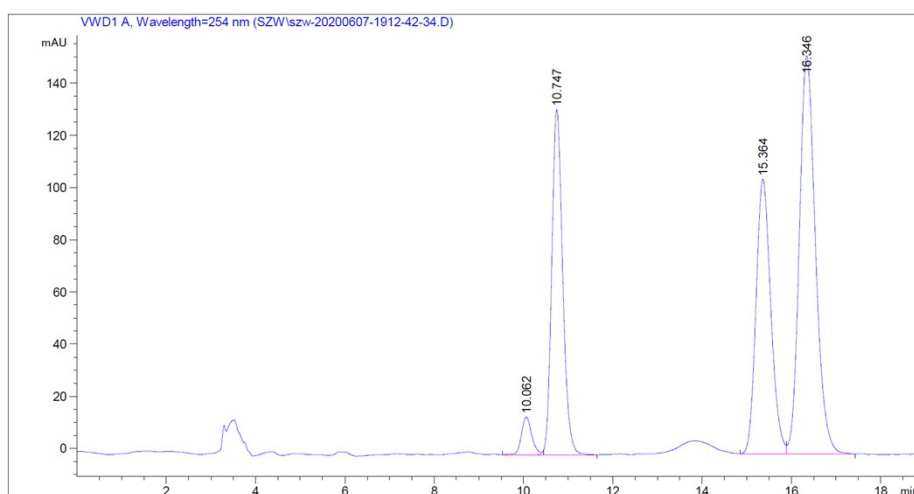


```

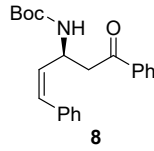
NAME          600M
EXPNO         50
PROCNO        1
Date_         20210902
Time          15.21 h
INSTRUM       Avance
PROBHD        zgpg30
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            1024
DS            4
SWH           35714.283 Hz
FIDRES        1.089913 Hz
AQ            0.9175540 sec
RG            101
DW            14.000 usec
DE            18.00 usec
TE            298.0 K
D1            2.00000000 sec
D11           0.03000000 sec
TDO           1
SFO1          150.9279578 MHz
NUC1          13C
PQ            3.33 usec
PI            10.00 usec
SI            32768
SF            150.9128665 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```



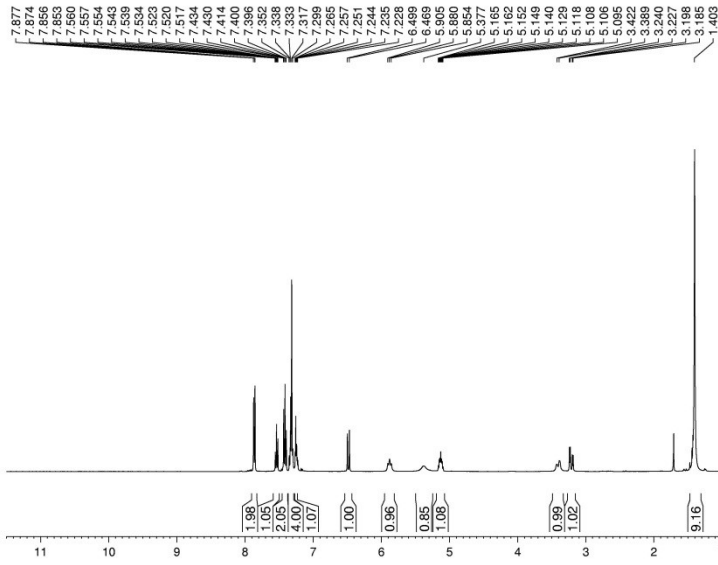
峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	9.998	BV	0.2706	9720.37891	562.51489	27.3789
2	10.711	VB	0.2837	9534.47656	522.89648	26.8553
3	15.331	BV	0.3703	8203.58984	343.94141	23.1066
4	16.318	VB	0.3953	8044.73975	314.58917	22.6592



峰 #	保留时间 [min]	类型	峰宽 [min]	峰面积 [mAU*s]	峰高 [mAU]	峰面积 %
1	10.062	BV E	0.2459	233.70375	14.51217	2.6736
2	10.747	VB R	0.2629	2254.77661	132.25308	25.7949
3	15.364	VV	0.3571	2429.12354	105.30725	27.7894
4	16.346	VB	0.3833	3823.57617	152.62387	43.7421

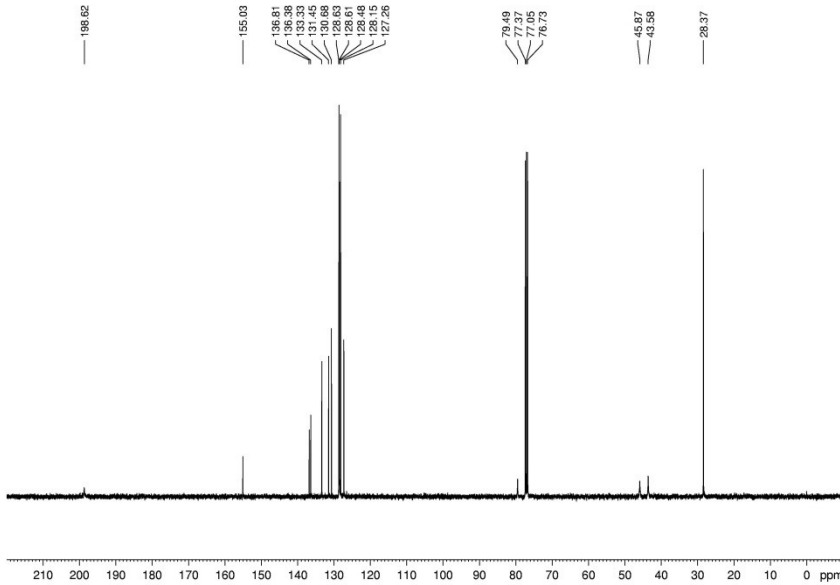


2-reduce chiral



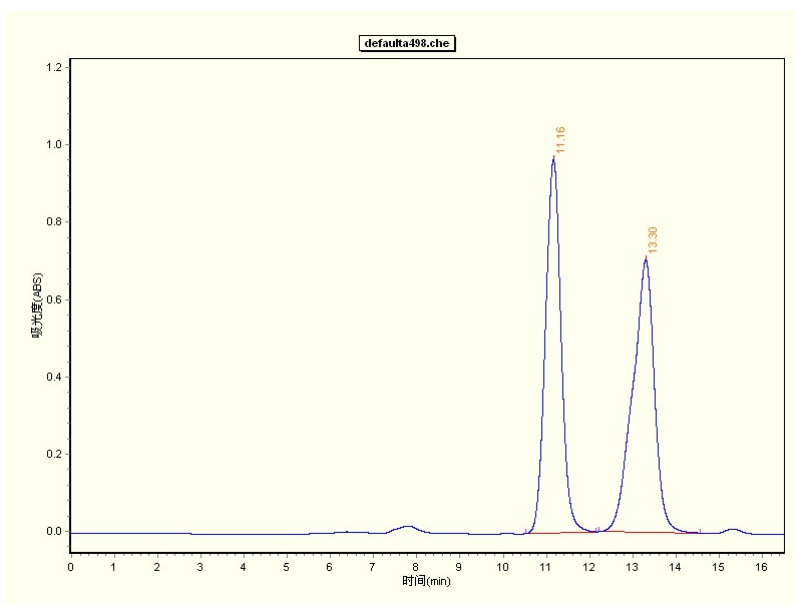
```

NAME          new400M
EXPNO         158
PROCNO        1
Date_         20200816
Time         11.20 h
INSTRUM       Avance
PROBHD        Z116098_0861 (
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS           0
DS           0
SWH           5555.556 Hz
FIDRES       0.165942 Hz
AQ           5.8982902 sec
RG           91.9728
DM           30.000 usec
DE           9.46 usec
TE           296.9 K
D1           1.00000000 sec
TDO          1
SFO1         400.1321847 MHz
NUC1          1H
PQ           3.50 usec
P1           10.50 usec
SI           65536
SF           400.1300107 MHz
WDW           EM
SSB           0
LB           0.30 Hz
GB           0
PC           1.00
  
```

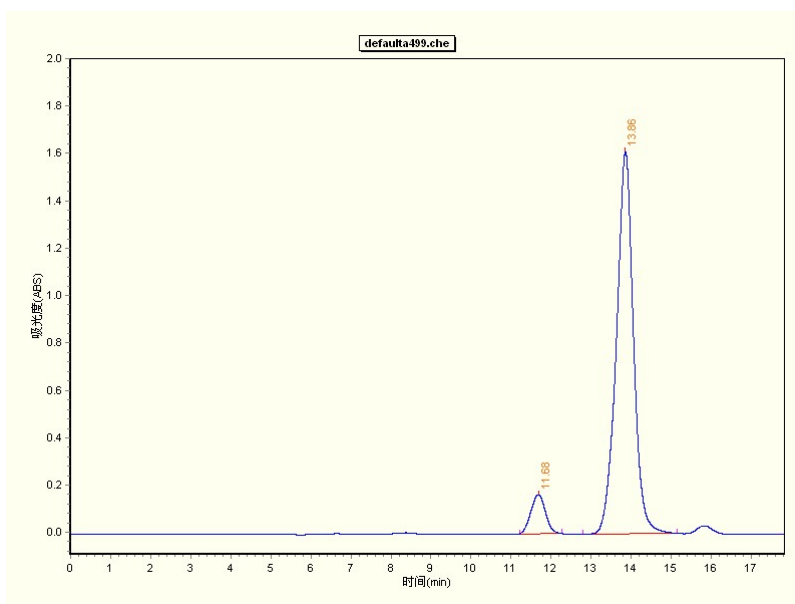


```

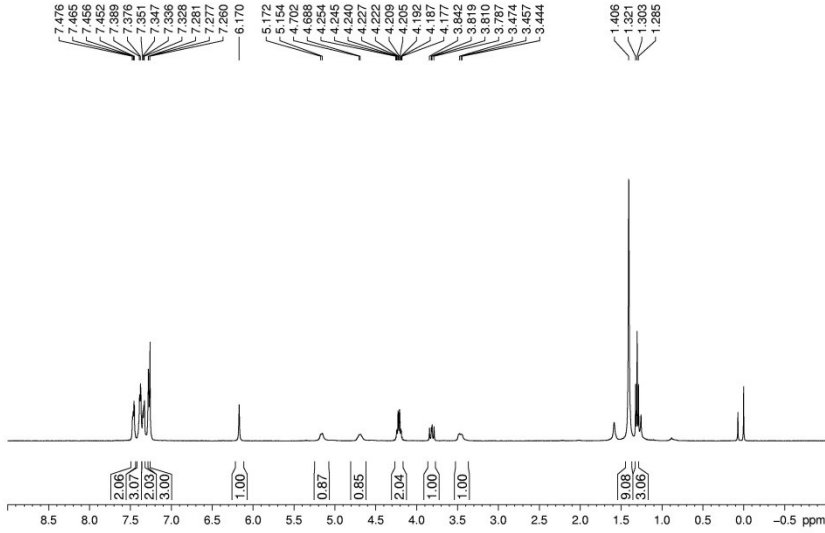
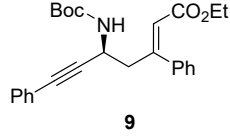
NAME          new400M
EXPNO         159
PROCNO        1
Date_         20200816
Time         11.50 h
INSTRUM       Avance
PROBHD        Z116098_0861 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS           512
DS           0
SWH          25000.000 H
FIDRES       0.762939 H
AQ           1.3107700 s
RG           38.0156
DM           20.000 u
DE           6.50 u
TE           297.5 K
D1           2.00000000 s
D11          0.03000000 s
TDO          1
SFO1         100.6238339 M
NUC1          13C
PQ           3.17 u
P1           9.50 u
SI           32768
SF           100.6127665 M
WDW           EM
SSB           0
LB           1.00 H
GB           0
PC           1.40
  
```



Entry	Retention time	Area	Height	Area%	Width	Type
1	11.16	12179548	482890	49.58	1.638	BB
2	13.30	12385121	352663	50.42	2.342	BB

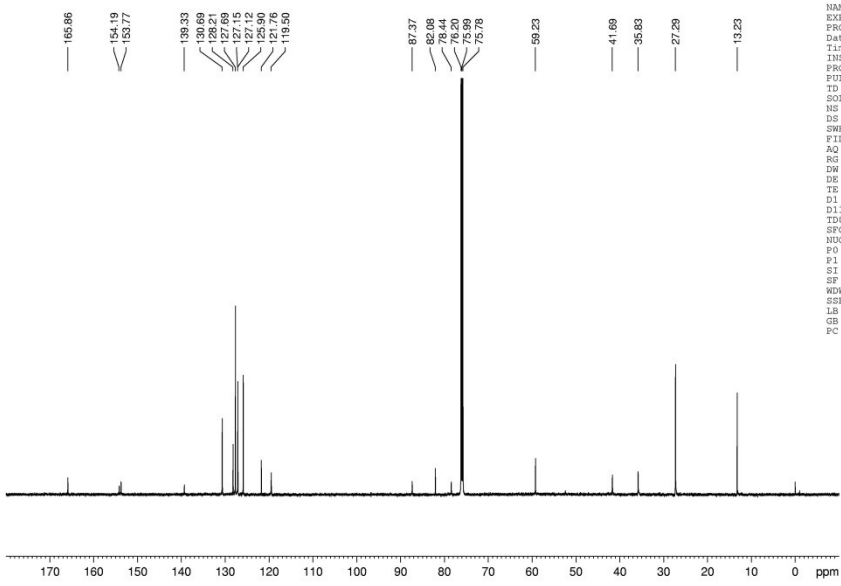


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.68	2076152	82245	8.00%	1.053	BB
2	13.86	23861802	806714	92.00%	2.353	BB



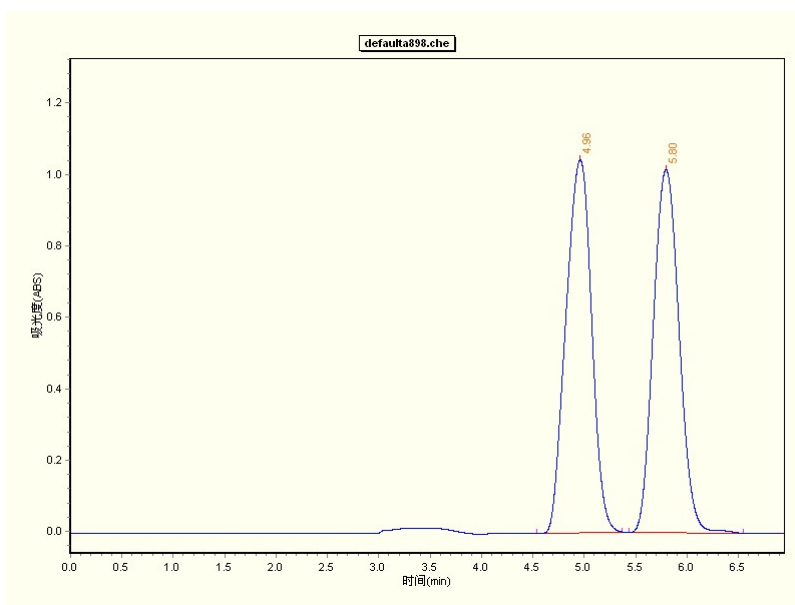
```

NAME          new400M
EXPNO         246
PROCNO        1
Date_         20210309
Time          16.35 h
INSTRUM       Avance
PROBHD        Z116098_0801 (
PULPROG       zg30
TD            65536
SOLVENT       CDCl3
NS            0
DS            0
SWH           5555.556 Hz
FIDRES        0.189942 Hz
AQ            3.4882302 sec
RG            101
DW            90.000 usec
DE            9.37 usec
TE            297.3 K
D1            1.0000000 sec
TDO           1
SFO1          400.1321847 MHz
NUC1          1H
P0            3.67 usec
P1            11.00 usec
SI            65536
SF            400.1300993 MHz
WDW           EM
SSB           0
LB            0.38 Hz
GB            0
PC            1.00
  
```

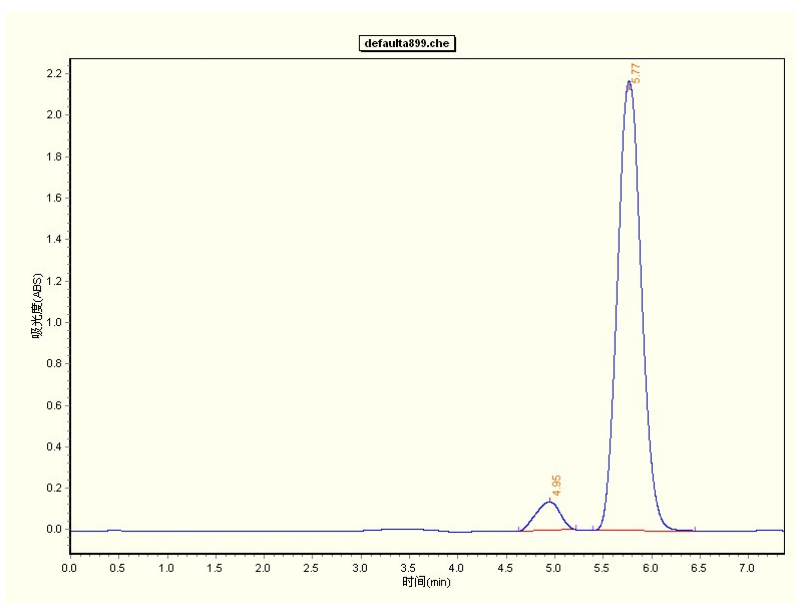


```

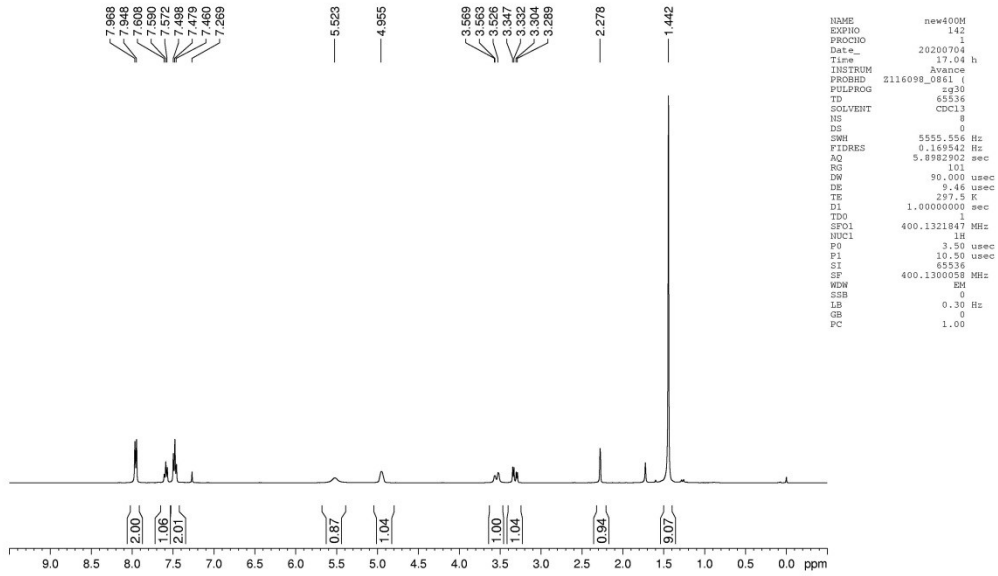
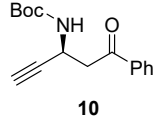
NAME          600M
EXPNO         45
PROCNO        1
Date_         20210901
Time          16.50 h
INSTRUM       Avance
PROBHD        Z168773_0024 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            512
DS            4
SWH           35714.285 Hz
FIDRES        1.089913 Hz
AQ            0.9175540 sec
RG            101
DW            14.000 usec
DE            18.00 usec
TE            298.0 K
D1            2.0000000 sec
D11           0.03000000 sec
ID0           1
SFO1          150.9279578 MHz
NUC1          13C
P0            3.13 usec
P1            10.00 usec
SI            32768
SF            150.9130227 MHz
WDW           EM
SSB           0
LB            1.00 Hz
GB            0
PC            1.40
  
```

Entry	Retention time	Area	Height	Area%	Width	Type
1	4.96	9048948	521925	50.47%	0.823	BB
2	5.80	8879292	508723	49.53%	1.111	BB

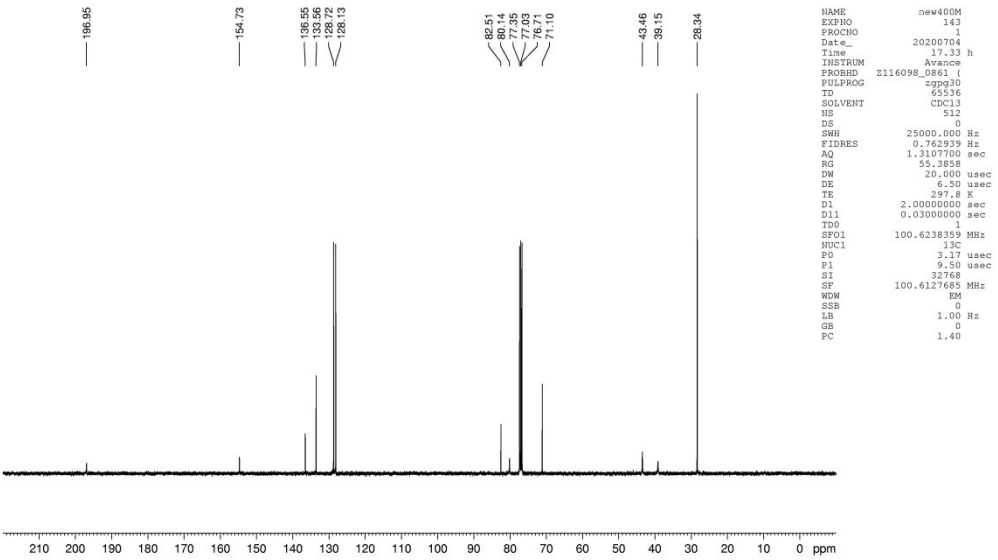


Entry	Retention time	Area	Height	Area%	Width	Type
1	4.95	1190945	68495	6.03%	0.592	BB
2	5.77	18562365	1084409	93.97%	1.059	BB



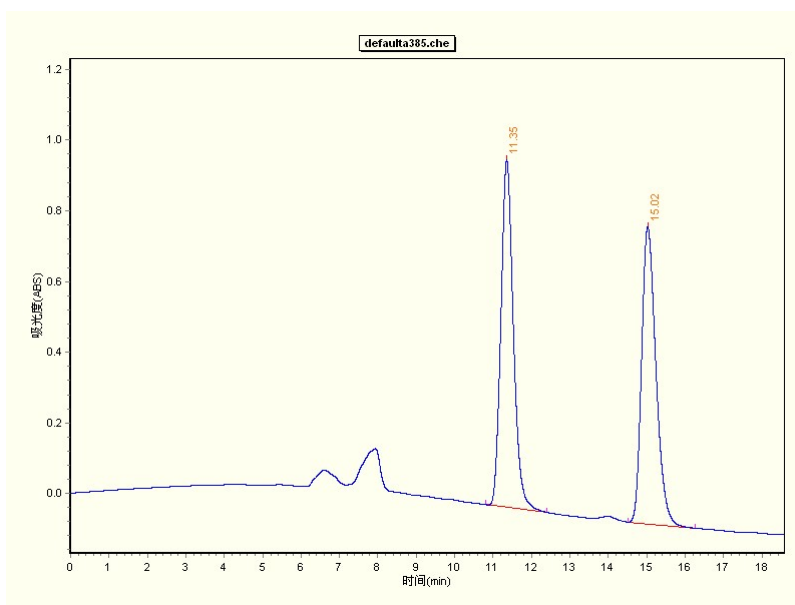
```

NAME          new400M
EXPNO         142
PROCNO        1
Date_         20200704
Time         17.04 h
INSTRUM       Avance
PROBHD        Z116098_0861 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            3
DS            0
SWH           5555.558 Hz
FIDRES        0.169542 Hz
AQ           5.8982902 sec
RG           101
DW           90.000 usec
DE           9.46 usec
TE           297.8 K
D1           1.00000000 sec
TD0          1
SFO1         400.1321847 MHz
NUC1         1H
PQ           3.50 usec
P1           10.50 usec
SI           65536
SF           400.1300058 MHz
WDW          EM
SSB           0
LB           0.30 Hz
GB           0
PC           1.00
  
```

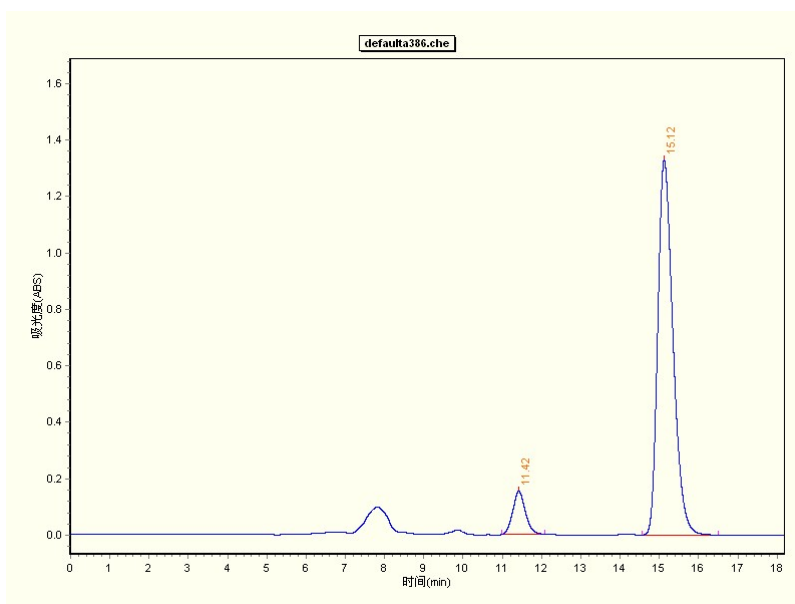


```

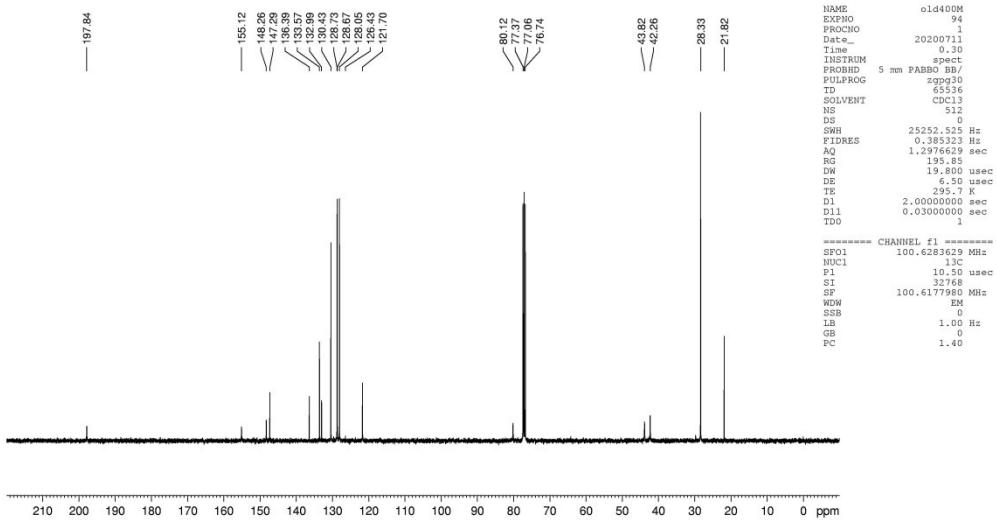
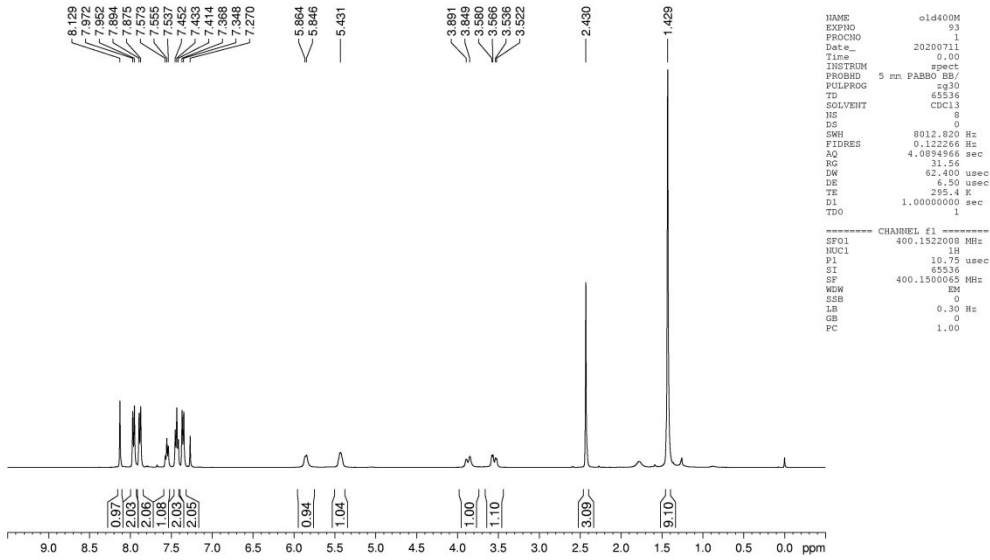
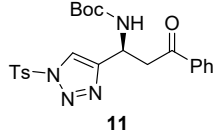
NAME          new400M
EXPNO         143
PROCNO        1
Date_         20200704
Time         17.33 h
INSTRUM       Avance
PROBHD        Z116098_0861 (
PULPROG       zgpg30
TD            65536
SOLVENT       CDCl3
NS            312
DS            0
SWH          25000.000 Hz
FIDRES        0.162939 Hz
AQ           1.3107700 sec
RG           55.3858
DW           20.000 usec
DE           6.50 usec
TE           297.8 K
D1           2.00000000 sec
D11          0.03000000 sec
TD0          1
SFO1         100.6238359 MHz
NUC1         13C
PQ           3.17 usec
P1           9.50 usec
SI           32768
SF           100.6127685 MHz
WDW          EM
SSB           0
LB           1.00 Hz
GB           0
PC           1.40
  
```

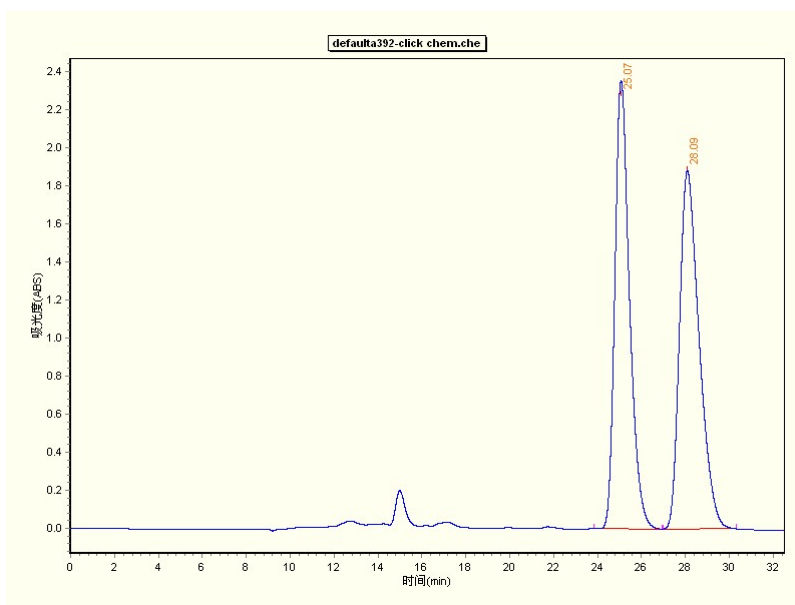


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.35	11040647	491153	50.43%	1.584	BB
2	15.02	10851482	419916	49.57%	1.750	BB

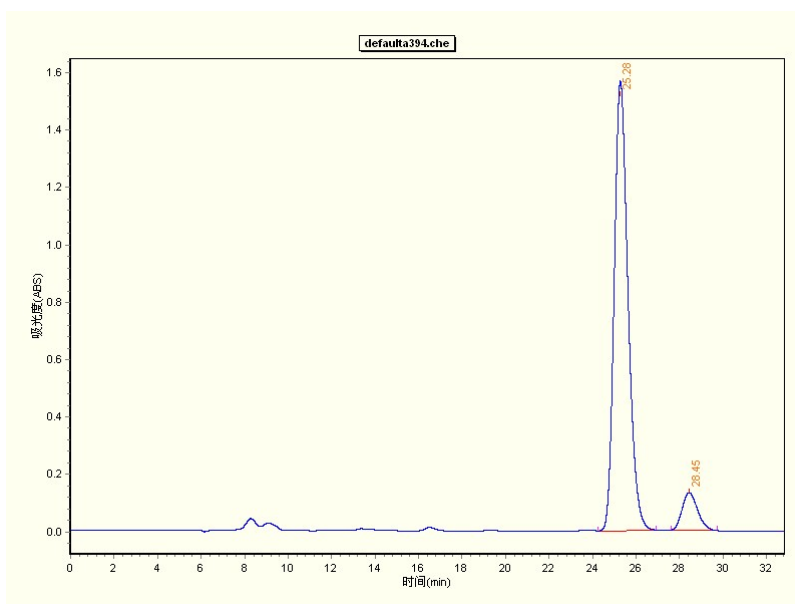


Entry	Retention time	Area	Height	Area%	Width	Type
1	11.42	1693487	76403	8.66%	1.082	BB
2	15.12	17867322	664704	91.34%	1.946	BB





Entry	Retention time	Area	Height	Area%	Width	Type
1	25.07	54660280	1178274	48.35%	3.093	BB
2	28.09	58390624	943437	51.65%	3.293	BB



Entry	Retention time	Area	Height	Area%	Width	Type
1	25.28	34395523	782626	91.42%	2.668	BB
2	28.45	3226896	65467	8.58%	2.115	BB