

# Asymmetric Organocatalytic Cascade Michael/Hemiketalization/retro-Henry Reaction of $\beta,\gamma$ -Unsaturated Ketoesters with $\alpha$ -Nitroketones

Yaojun Gao, Qiao Ren, Woon-Yew, Siau, and Jian Wang\*

Department of Chemistry, National University of Singapore

3 Science Drive 3, Singapore 117543

Email: [chmwangj@nus.edu.sg](mailto:chmwangj@nus.edu.sg)

## Supporting Information

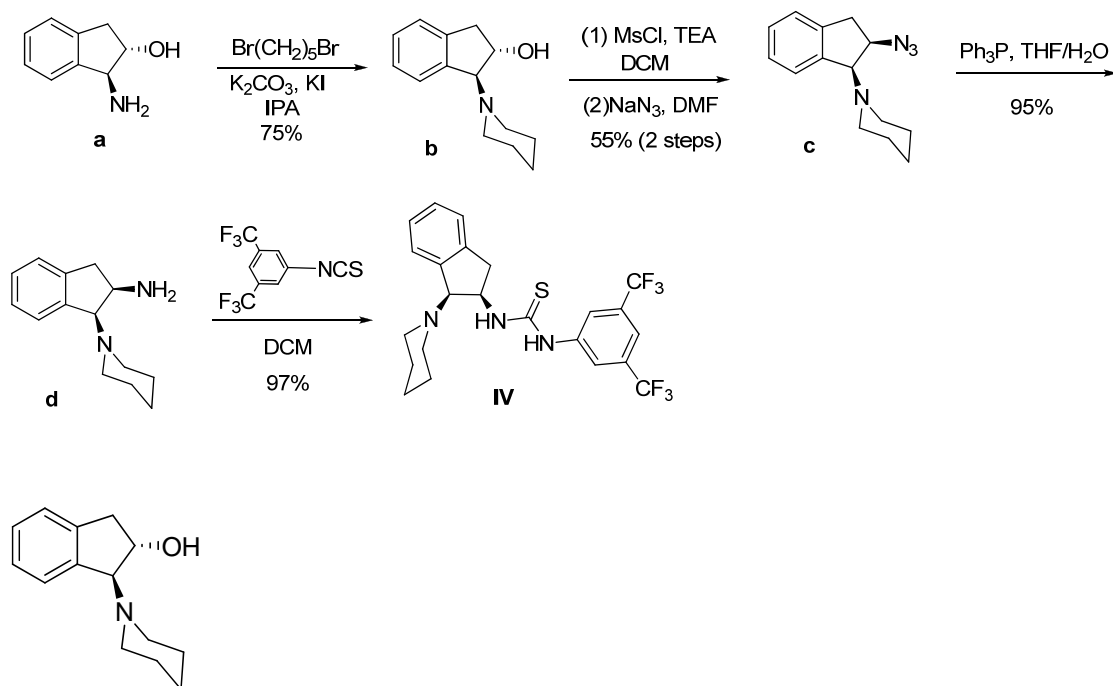
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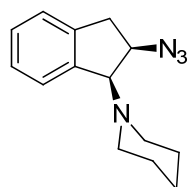
## 1. General information

Chemicals and solvents were purchased from commercial suppliers and used as received.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were recorded on a Bruker ACF300 (300 MHz) or AMX500 (500 MHz) spectrometer. Chemical shifts were reported in parts per million (ppm), and the residual solvent peak was used as an internal reference: proton (chloroform  $\delta$  7.26), carbon (chloroform  $\delta$  77.0) or tetramethylsilane (TMS  $\delta$  0.00) was used as a reference. Multiplicity was indicated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), dd (doublet of doublet), bs (broad singlet). Coupling constants were reported in Hertz (Hz). Low resolution mass spectra were obtained on a Finnigan/MAT LCQ spectrometer in ESI mode, and a Finnigan/MAT 95XL-T mass spectrometer in EI mode. All high resolution mass spectra were obtained on a Finnigan/MAT 95XL-T mass spectrometer. For thin layer chromatography (TLC), Merck pre-coated TLC plates (Merck 60 F254) were used, and compounds were visualized with a UV light at 254 nm. Further visualization was achieved by staining with  $\text{KMnO}_4$  solution, or ninhydrin followed by heating using a heat gun. Flash chromatography separations were performed on Merck 60 (0.040-0.063 mm) mesh silica gel. The enantiomeric excesses of products were determined by chiral phase HPLC analysis. Optical rotations were recorded on Jasco DIP-1000 polarimeter.

## 2. General procedure for preparation of the catalyst IX.

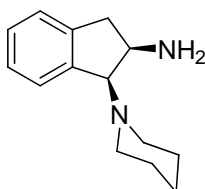


**(1S,2S)-1-(Piperidin-1-yl)-2,3-dihydro-1H-inden-2-ol (a)**. Compound **a** (0.75 g, 5 mmol), 1,5-dibromopentane (1.38 g, 6.0 mmol), potassium carbonate (1.80 g, 13 mmol), potassium iodide (0.17 g, 1.0 mmol) and 10 mL iso-propanol were added into a sealed tube. The mixture was heated at 80 °C for 48hrs and then allowed to cool to room temperature. The mixture was filtered and washing with DCM, the filtrate was concentrated and the resulting residue was purified by silica gel chromatography (eluting with 1 : 5 EtOAc- hexane then 1:10 methanol-DCM) to obtain the product **b** (0.82 g, 75% yield).  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 7.36-7.33 (m, 1H), 7.12-7.16 (m, 3H), 4.66 (dd,  $J$  = 12.3, 5.3 Hz, 1H), 4.08 (d,  $J$  = 4.8 Hz, 1H), 3.25 (dd,  $J$  = 16.2, 7.1 Hz, 1H), 2.80 (dd,  $J$  = 16.2, 5.5 Hz, 1H), 2.62-2.61 (m, 4H), 1.58-1.54 (m, 4H), 1.46 (d,  $J$  = 5.3 Hz, 2H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 140.62, 140.33, 127.66, 126.41, 125.82, 124.90, 78.49, 73.54, 50.79, 40.06, 26.51, 24.66; HRMS (ESI) calcd for  $\text{C}_{14}\text{H}_{20}\text{NO}$  ( $\text{M} + \text{H}^+$ ) 218.1545, found 218.1545.

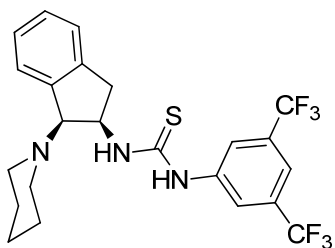


**1-((1S,2R)-2-Azido-2,3-dihydro-1H-inden-1-yl)piperidine (c)**. To a stirred solution of compound **b** (0.78

g, 3.6 mmol) and triethylamine (1.1 g, 10.8 mmol) in dry DCM (10 mL) at 0°C under nitrogen was added dropwise methanesulfonyl chloride (0.62 g, 5.4 mmol). The mixture was stirred for another 20 min at room temperature, and the solvent was evaporated under reduced pressure. The residue was extracted with DCM, washed successively with water, and brine, and dried over MgSO<sub>4</sub>. The organic layer was concentrated to afford crude mesylate intermediate. Then the crude mesylate intermediate was redissolved in DMF (10 mL), followed by adding NaN<sub>3</sub> (1.87 g, 28.8 mmol). The mixture was heated under nitrogen at 70°C for 6 hrs. After the mixture was cooled, the solvent was evaporated under reduced pressure and the residue was extracted with EtOAc (25 mL x 3) and dried over MgSO<sub>4</sub>. The organic layer was removed under reduced pressure, and the crude product was purified by silica gel chromatography (eluting with 1:10 EtOAc-hexane) to afford product **c** (0.48 g, 55% yield, two step). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.26-7.10 (m, 4H), 4.63 (d, *J* = 6.9 Hz, 1H), 3.17 (td, *J* = 8.0 Hz, 6.8, 1H), 3.03 (dd, *J* = 15.8, 7.9 Hz, 1H), 2.81 (dd, *J* = 15.8, 7.9 Hz, 1H), 2.48 (ddt, *J* = 38.5, 10.7, 5.2 Hz, 4H), 1.53 (dt, *J* = 11.3, 5.7 Hz, 4H), 1.39 (dd, *J* = 11.7, 6.0 Hz, 2H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 140.43, 139.14, 128.56, 126.94, 124.71, 124.15, 72.82, 66.85, 51.91, 33.83, 25.94, 24.30; HRMS (ESI) calcd for C<sub>14</sub>H<sub>19</sub>N<sub>4</sub> (M + H<sup>+</sup>) 243.1610, found 243.1612.



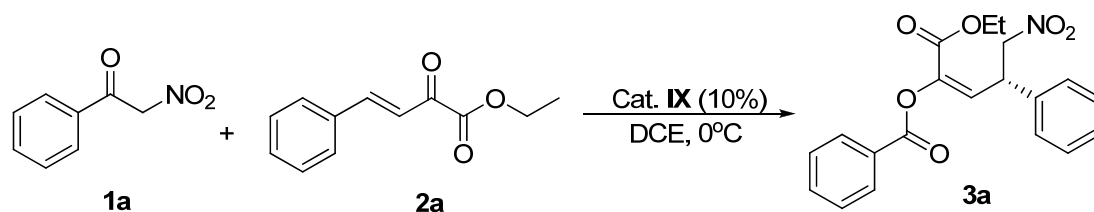
**(1S,2R)-1-(Piperidin-1-yl)-2,3-dihydro-1H-inden-2-amine (d).** To a solution of compound **c** (0.46 g, 1.9 mmol) in 10 mL THF was added triphenylphosphane (1.5 g, 5.7 mmol). The mixture was stirred at room temperature for 3h, then added 3 mL water, heated at 60°C for 4 hrs. The solvent was removed by reduced pressure, and the resulting residue was purified by a very short silica gel column (eluting with 1:10 to 1: 5 methanol-DCM) to afford compound **d** (0.39g, 95% yield). <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>): δ = 7.27 (t, *J* = 5.8 Hz, 1H), 7.19-7.11 (m, 3H), 4.31 (d, *J* = 6.9 Hz, 1H), 2.99-2.83 (m, 3H), 2.60-2.58(m, 4H), 2.45 (s, 2H), 1.64-1.59 (m, 4H), 1.45 (dt, *J* = 11.7, 5.8 Hz, 2H); <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>): δ = 144.92, 139.73, 127.18, 126.54, 124.36, 123.34, 77.45, 58.16, 51.84, 31.67, 25.82, 24.29; HRMS (ESI) calcd for C<sub>14</sub>H<sub>21</sub>N<sub>2</sub> (M + H<sup>+</sup>) 217.1705, found 217.1708.



**1-(3,5-Bis(trifluoromethyl)phenyl)-3-((1S,2R)-1-(piperidin-1-yl)-2,3-dihydro-1H-inden-2-yl)thiourea**

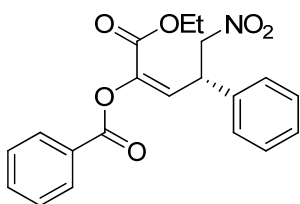
**(IV)**. To a solution of compound **d** (0.39 g, 1.81 mmol) in 10 mL DCM was added 1-isothiocyanato-3,5-bis(trifluoromethyl)benzene (0.52 g, 1.90 mmol) dropwise. The mixture was stirred at room temperature for 30min, reaction completed. The solvent was removed by rotary evaporation and pure product **IV** (0.90 g, 97% yield) was obtained by silica gel chromatography (eluting with 1:10 EtOAc- hexane then 1: 10 methanol-DCM).  $^1\text{H}$  NMR (300 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 12.14 (s, 1H), 7.98 (s, 2H), 7.61 (s, 1H), 7.27 (ddd,  $J$  = 20.9, 12.6, 4.3 Hz, 4H), 6.68 (s, 1H), 5.22 (m, 1H), 3.63 (dd,  $J$  = 6.2, 8.3 Hz, 1H), 3.13 (dd,  $J$  = 16.1, 8.6 Hz, 1H), 2.92 (dd,  $J$  = 16.2, 8.9 Hz, 1H), 2.68-2.60 (m, 4H), 1.56-1.44 (m, 6H);  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ ):  $\delta$  = 183.34, 141.50, 140.33, 137.67, 132.31, 131.87, 131.42, 130.98, 129.36, 127.78, 125.76, 125.53, 124.93, 123.58, 121.31, 118.75, 75.21, 62.01, 50.56, 26.29, 25.90, 23.78; HRMS (ESI) calcd for  $\text{C}_{23}\text{H}_{24}\text{F}_6\text{N}_3\text{S}$  ( $\text{M} + \text{H}^+$ ) 488.1595, found 488.1587.

**3. Representative procedure for Michael addition reaction**

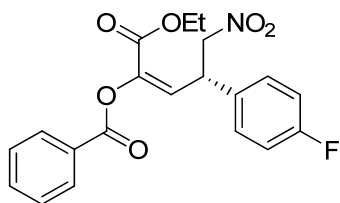


**General procedure:** To a solution of 2-Nitro-1-phenylethanone **1a** (16.5 mg, 0.1 mmol) in 0.45 mL DCE was added (*E*)-Ethyl 2-oxo-4-phenylbut-3-enoate **2a** (22.5 mg, 0.11 mmol) at 0°C, followed by adding of 50  $\mu$ L of pre-cooled catalyst **IV** solution (4.9 mg in 50  $\mu$ L DCE, 0.01 mmol). The mixture was stirred at 0°C for 24 h. The crude product was purified by column chromatography on silica gel, eluted by hexane/EtOAc= 5:1 to afford 35.1 mg (95% yield) of the desired product **3a** as colorless oil.

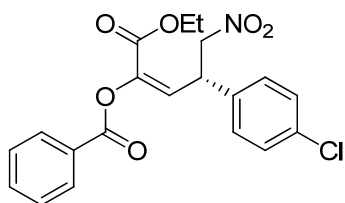
#### 4. Analytical data of Michael addition reaction products



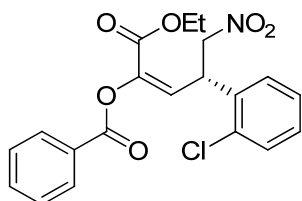
(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl benzoate (**3a**) (Table 3, entry 1)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.11 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.67-7.64 (m, 1H), 7.51 (t,  $J = 7.9$  Hz, 2H), 7.35-7.22 (m, 5H), 6.75 (d,  $J = 9.5$  Hz, 1H), 4.73 (d,  $J = 7.6$  Hz, 2H), 4.60 (dd,  $J = 17.2, 7.7$  Hz, 1H), 4.24 (q,  $J = 7.1$  Hz, 2H), 1.26 (t,  $J = 7.1$  Hz, 4H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.17, 161.19, 140.42, 136.56, 134.04, 130.37, 129.34, 128.67, 128.27, 128.16, 127.43, 127.17, 78.42, 61.99, 41.12, 14.02; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{19}\text{NNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 392.1110, found 392.1109; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 13.47$  min,  $t_{\text{minor}} = 17.81$  min,  $ee = 92\%$ ;  $[\alpha]_{\text{D}}^{25} = +111.5$  ( $c = 1.23$  in  $\text{CHCl}_3$ ).



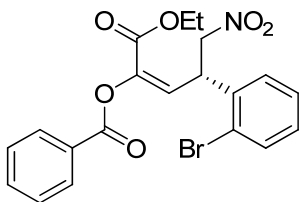
**(*S,E*)-1-ethoxy-4-(4-fluorophenyl)-5-nitro-1-oxopent-2-en-2-yl benzoate (3b)** (Table 3 , entry 2)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.10 (dt,  $J = 8.5, 1.6$  Hz, 2H), 7.68-7.65 (m, 1H), 7.53-7.50 (m, 2H), 7.22-7.19 (m, 2H), 7.04-7.00 (m, 2H), 6.72 (d,  $J = 9.5$  Hz, 1H), 4.74-4.67 (m, 2H), 4.58 (dt,  $J = 15.4, 7.6$  Hz, 1H), 4.24 (qd,  $J = 7.1, 0.8$  Hz, 2H), 1.26 (t,  $J = 7.3$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta$  164.15, 164.07, 161.11, 160.78, 140.53, 134.14, 132.35, 132.31, 130.34, 129.19, 129.08, 128.71, 128.03, 126.80, 116.46, 116.16, 78.38, 62.07, 40.39, 14.00; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{18}\text{FNNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 410.1016, found 410.1012; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 11.59$  min,  $t_{\text{minor}} = 14.90$  min,  $ee = 90\%$ ;  $[\alpha]_{\text{D}}^{25} = +88.5$  ( $c = 1.13$  in  $\text{CHCl}_3$ ).



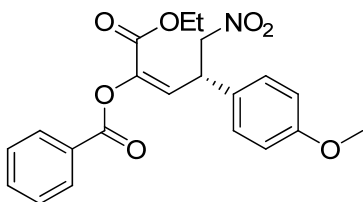
**(*S,E*)-4-(4-chlorophenyl)-1-ethoxy-5-nitro-1-oxopent-2-en-2-yl benzoate (3c)** (Table 3 , entry 3)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.10-8.09 (m, 2H), 7.68-7.65 (m, 1H), 7.53-7.50 (m, 2H), 7.32-7.29 (m, 2H), 7.18-7.16 (m, 2H), 6.70 (d,  $J = 9.5$  Hz, 1H), 4.74-4.68 (m, 2H), 4.57 (dd,  $J = 17.0, 7.6$  Hz, 1H), 4.27-4.22 (m, 2H), 1.26 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (75 MHz,  $\text{CDCl}_3$ )  $\delta$  164.13, 161.06, 140.70, 135.05, 134.29, 134.17, 130.36, 129.53, 128.80, 128.73, 127.99, 126.49, 78.16, 62.10, 40.50, 14.01; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{18}\text{ClNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 426.0720, found 426.0718; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 12.02$  min,  $t_{\text{minor}} = 15.05$  min,  $ee = 90\%$ ;  $[\alpha]_{\text{D}}^{25} = +122.3$  ( $c = 1.13$  in  $\text{CHCl}_3$ ).



**(*S,E*)-4-(2-chlorophenyl)-1-ethoxy-5-nitro-1-oxopent-2-en-2-yl benzoate (3d)** (Table 3 , entry 4)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.07-8.05 (m, 2H), 7.65-7.62 (m, 1H), 7.50-7.47 (m, 2H), 7.34 (dd,  $J = 7.7, 1.7$  Hz, 1H), 7.28-7.19 (m, 3H), 6.82 (d,  $J = 8.8$  Hz, 1H), 5.11 (td,  $J = 8.5, 6.9$  Hz, 1H), 4.80-4.72 (m, 2H), 4.25 (q,  $J = 6.9$  Hz, 2H), 1.27 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  163.98, 161.13, 140.98, 134.20, 133.96, 133.56, 130.44, 130.28, 129.44, 128.96, 128.56, 128.06, 127.63, 125.92, 77.03, 62.02, 38.08, 14.01; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{18}\text{ClNNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 426.0720, found 426.0714; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 12.67$  min,  $t_{\text{minor}} = 15.99$  min,  $ee = 97\%$ ;  $[\alpha]_{\text{D}}^{25} = +30.9$  ( $c = 1.2$  in  $\text{CHCl}_3$ ).



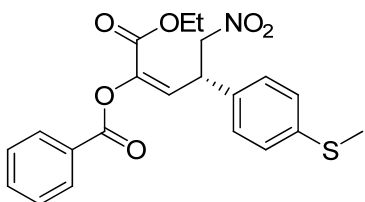
**(*S,E*)-4-(2-bromophenyl)-1-ethoxy-5-nitro-1-oxopent-2-en-2-yl benzoate (3e)** (Table 3 , entry 5)  $^1\text{H}$  NMR (500 MHz, MeOD)  $\delta$  8.06 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.63 (t,  $J = 7.4$  Hz, 1H), 7.53-7.46 (m, 3H), 7.29-7.26 (m, 2H), 7.14-7.10 (m, 1H), 6.82 (d,  $J = 8.8$  Hz, 1H), 5.15 (td,  $J = 8.7, 6.6$  Hz, 1H), 4.78-4.69 (m, 2H), 4.25 (q,  $J = 6.9$  Hz, 2H), 1.27 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  163.97, 161.14, 141.03, 135.96, 133.94, 133.74, 130.32, 129.67, 128.90, 128.54, 128.26, 128.09, 126.01, 124.04, 77.22, 62.02, 40.33, 14.02; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{18}\text{BrNNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 470.0215, found 470.0216; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 14.73$  min,  $t_{\text{minor}} = 15.90$  min,  $ee = 96\%$ ;  $[\alpha]_{\text{D}}^{25} = +0.8$  ( $c = 1.4$  in  $\text{CHCl}_3$ ).



**(*S,E*)-1-ethoxy-4-(4-methoxyphenyl)-5-nitro-1-oxopent-2-en-2-yl benzoate (3f)** (Table 3 , entry 6)  $^1\text{H}$

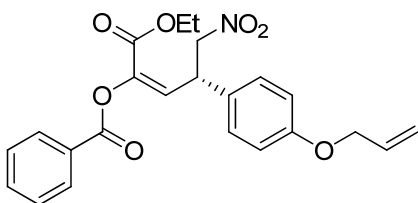


NMR (500 MHz, CDCl<sub>3</sub>) δ 8.12-8.10 (m, 2H), 7.67-7.64 (m, 1H), 7.53-7.50 (m, 2H), 7.15-7.13 (m, 2H), 6.86-6.84 (m, 2H), 6.72 (d, *J* = 9.8 Hz, 1H), 4.70-4.68 (m, 2H), 4.54 (dt, *J* = 15.8, 7.9 Hz, 1H), 4.24 (q, *J* = 7.3 Hz, 2H), 3.77 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>) δ 164.19, 161.25, 159.44, 140.11, 134.02, 130.37, 128.67, 128.51, 128.39, 128.20, 127.44, 114.73, 78.61, 61.96, 55.28, 40.45, 14.02; HRMS (ESI) calcd for C<sub>21</sub>H<sub>21</sub>NNaO<sub>7</sub> (M + Na<sup>+</sup>) 422.1216, found 422.1213; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min, λ = 254 nm): *t*<sub>major</sub> = 18.39 min, *t*<sub>minor</sub> = 24.11 min, *ee* = 93%; [α]<sub>D</sub><sup>25</sup> = +113.3 (*c* = 1.07 in CHCl<sub>3</sub>).



**(*S,E*)-1-ethoxy-4-(4-(methylthio)phenyl)-5-nitro-1-oxopent-2-en-2-yl benzoate (3g)** (Table 3, entry 7)

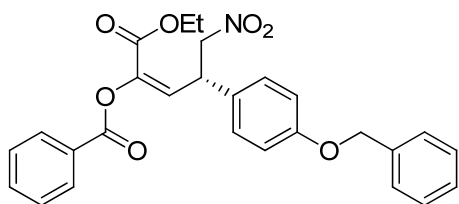
<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 8.11-8.09 (m, 2H), 7.66 (t, *J* = 7.6 Hz, 1H), 7.51 (t, *J* = 7.9 Hz, 2H), 7.21-7.19 (m, 2H), 7.15-7.13 (m, 2H), 6.71 (d, *J* = 9.5 Hz, 1H), 4.70 (d, *J* = 7.9 Hz, 2H), 4.55 (dd, *J* = 17.0, 7.9 Hz, 1H), 4.24 (q, *J* = 7.1 Hz, 2H), 2.44 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>) δ 164.15, 161.16, 140.38, 139.02, 134.07, 133.08, 130.35, 128.68, 128.11, 127.84, 127.18, 126.97, 78.30, 62.01, 40.64, 15.59, 14.01; HRMS (ESI) calcd for C<sub>21</sub>H<sub>21</sub>NNaO<sub>6</sub>S (M + Na<sup>+</sup>) 438.0987, found 438.0960; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min, λ = 254 nm): *t*<sub>major</sub> = 18.50 min, *t*<sub>minor</sub> = 23.57 min, *ee* = 91%; [α]<sub>D</sub><sup>25</sup> = +157.6 (*c* = 1.13 in CHCl<sub>3</sub>).



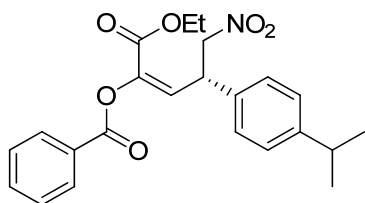
**(*S,E*)-4-(4-(allyloxy)phenyl)-1-ethoxy-5-nitro-1-oxopent-2-en-2-yl benzoate (3h)** (Table 3, entry 8)

<sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 8.12-8.10 (m, 2H), 7.67-7.64 (m, 1H), 7.53-7.50 (m, 2H), 7.14-7.13 (m, 2H), 6.88-6.85 (m, 2H), 6.72 (d, *J* = 9.8 Hz, 1H), 6.05-5.98 (m, 1H), 5.39 (ddd, *J* = 17.3, 3.2, 1.6 Hz, 1H), 5.28 (ddd, *J* = 10.4, 2.7, 1.3 Hz, 1H), 4.69 (d, *J* = 7.9 Hz, 2H), 4.53-4.49 (m, 3H), 4.26-4.22 (m, 2H), 1.26 (t, *J* =

7.1 Hz, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.19, 161.25, 158.45, 140.11, 134.03, 132.97, 130.37, 128.67, 128.53, 128.50, 128.17, 127.42, 117.82, 115.52, 78.59, 68.82, 61.97, 40.43, 14.02; HRMS (ESI) calcd for  $\text{C}_{23}\text{H}_{23}\text{NNaO}_7$  ( $\text{M} + \text{Na}^+$ ) 448.1372, found 448.1345; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 15.71$  min,  $t_{\text{minor}} = 20.80$  min,  $ee = 93\%$ ;  $[\alpha]_{\text{D}}^{25} = +99.8$  ( $c = 1.0$  in  $\text{CHCl}_3$ ).

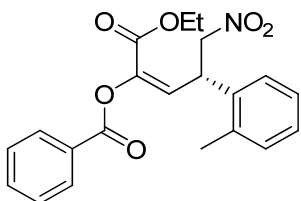


**(*S,E*)-4-(4-(benzyloxy)phenyl)-1-ethoxy-5-nitro-1-oxopent-2-en-2-yl benzoate (3i)** (Table 3 , entry 9)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.11 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.66 (t,  $J = 6.8$  Hz, 1H), 7.51 (t,  $J = 7.7$  Hz, 2H), 7.42-7.31 (m, 5H), 7.15-7.13 (m, 2H), 6.93-6.92 (m, 2H), 6.72 (d,  $J = 9.5$  Hz, 1H), 5.02 (s, 2H), 4.69 (d,  $J = 7.9$  Hz, 2H), 4.54 (dd,  $J = 17.2, 7.7$  Hz, 1H), 4.24 (q,  $J = 6.8$  Hz, 2H), 1.26 (t,  $J = 7.1$  Hz, 4H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.21, 161.25, 158.67, 140.15, 136.69, 134.03, 130.38, 128.68, 128.63, 128.56, 128.20, 128.06, 127.43, 127.40, 127.20, 115.66, 78.59, 70.08, 61.98, 40.46, 14.04; HRMS (ESI) calcd for  $\text{C}_{27}\text{H}_{25}\text{NNaO}_7$  ( $\text{M} + \text{Na}^+$ ) 498.1529, found 498.1508; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 19.08$  min,  $t_{\text{minor}} = 29.83$  min,  $ee = 93\%$ ;  $[\alpha]_{\text{D}}^{25} = +97.4$  ( $c = 1.17$  in  $\text{CHCl}_3$ ).

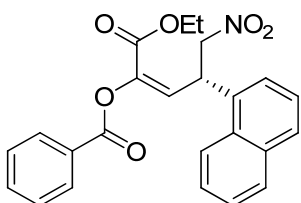


**(*S,E*)-1-ethoxy-4-(4-isopropylphenyl)-5-nitro-1-oxopent-2-en-2-yl benzoate (3j)** (Table 3 , entry 10)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.11 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.67-7.64 (m, 1H), 7.51 (dd,  $J = 10.7, 4.7$  Hz, 2H), 7.19-7.14 (m, 4H), 6.74 (d,  $J = 9.5$  Hz, 1H), 4.72 (d,  $J = 7.9$  Hz, 2H), 4.57 (dt,  $J = 15.8, 7.7$  Hz, 1H), 4.26-4.21 (m, 2H), 2.86 (dt,  $J = 13.9, 6.9$  Hz, 1H), 1.26 (t,  $J = 7.1$  Hz, 3H), 1.21 (d,  $J = 6.9$  Hz, 6H).  $^{13}\text{C}$

NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  164.17, 161.24, 148.99, 140.19, 134.00, 133.73, 130.36, 128.65, 128.18, 127.44, 127.37, 127.35, 78.48, 61.95, 40.79, 33.72, 23.82, 14.02; HRMS (ESI) calcd for C<sub>23</sub>H<sub>25</sub>NNaO<sub>6</sub> (M + Na<sup>+</sup>) 434.1580, found 434.1570; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda$  = 254 nm):  $t_{\text{major}}$  = 10.87 min,  $t_{\text{minor}}$  = 14.86 min,  $ee$  = 92%;  $[\alpha]_{\text{D}}^{25}$  = +108.6 ( $c$  = 0.93 in CHCl<sub>3</sub>).

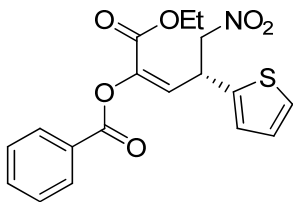


**(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-o-tolylpent-2-en-2-yl benzoate (3k)** (Table 3 , entry 11) <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  8.10-8.08 (m, 2H), 7.67-7.64 (m, 1H), 7.52-7.49 (m, 2H), 7.22-7.13 (m, 4H), 6.68 (d,  $J$  = 9.5 Hz, 1H), 4.89 (dt,  $J$  = 9.5, 7.7 Hz, 1H), 4.72 (dd,  $J$  = 7.6, 2.5 Hz, 2H), 4.24 (tt,  $J$  = 7.3, 3.6 Hz, 2H), 2.31 (s, 3H), 1.26 (t,  $J$  = 7.1 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  164.17, 161.18, 140.26, 136.21, 134.96, 134.04, 131.32, 130.29, 128.66, 128.11, 128.00, 127.35, 126.97, 126.13, 77.90, 61.99, 36.90, 19.34, 14.02; HRMS (ESI) calcd for C<sub>21</sub>H<sub>21</sub>NNaO<sub>6</sub> (M + Na<sup>+</sup>) 406.1267, found 406.1251; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda$  = 254 nm):  $t_{\text{major}}$  = 12.90 min,  $t_{\text{minor}}$  = 12.61 min,  $ee$  = 92%;  $[\alpha]_{\text{D}}^{25}$  = +67.5 ( $c$  = 0.93 in CHCl<sub>3</sub>).

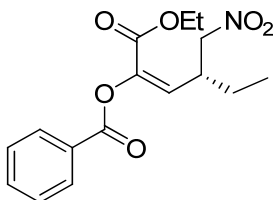


**(*S,E*)-1-ethoxy-4-(naphthalen-1-yl)-5-nitro-1-oxopent-2-en-2-yl benzoate (3l)** (Table 3 , entry 12) <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>)  $\delta$  8.06-8.01 (m, 3H), 7.86-7.84 (m, 1H), 7.79 (dd,  $J$  = 6.3, 3.2 Hz, 1H), 7.63 (t,  $J$  = 7.6 Hz, 1H), 7.50-7.42 (m, 6H), 6.87 (d,  $J$  = 8.8 Hz, 1H), 5.49 (dd,  $J$  = 15.8, 8.5 Hz, 1H), 4.92-4.85 (m, 2H), 4.23 (q,  $J$  = 7.1 Hz, 2H), 1.25 (t,  $J$  = 7.1 Hz, 3H). <sup>13</sup>C NMR (125 MHz, CDCl<sub>3</sub>)  $\delta$  164.08, 161.18, 140.64, 134.18, 133.96, 132.76, 130.79, 130.32, 129.25, 128.95, 128.59, 128.08, 127.42, 127.01, 126.17, 125.45, 124.59, 122.24, 78.03, 62.01, 36.45, 14.02; HRMS (ESI) calcd for C<sub>24</sub>H<sub>21</sub>NNaO<sub>6</sub> (M + Na<sup>+</sup>) 442.1267, found 442.1260; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda$  = 254

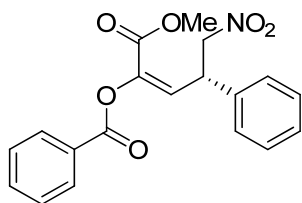
nm):  $t_{\text{major}} = 17.03$  min,  $t_{\text{minor}} = 27.08$  min,  $ee = 94\%$ ;  $[\alpha]_{\text{D}}^{25} = +2.6$  ( $c = 1.1$  in  $\text{CHCl}_3$ ).



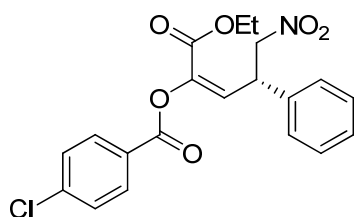
**(*R,E*)-1-ethoxy-5-nitro-1-oxo-4-(thiophen-2-yl)pent-2-en-2-yl benzoate (3m)** (Table 3 , entry 13)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.14 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.68-7.65 (m, 1H), 7.52 (t,  $J = 7.9$  Hz, 2H), 7.25 (dd,  $J = 5.4, 1.6$  Hz, 1H), 6.96 (dt,  $J = 7.6, 3.5$  Hz, 2H), 6.72 (d,  $J = 9.8$  Hz, 1H), 4.92-4.89 (m, 1H), 4.74 (qd,  $J = 12.6, 7.4$  Hz, 2H), 4.26 (q,  $J = 7.1$  Hz, 2H), 1.28 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.16, 161.09, 140.64, 138.65, 134.13, 130.43, 128.71, 128.06, 127.38, 126.36, 125.71, 125.45, 78.68, 62.11, 36.33, 14.02; HRMS (ESI) calcd for  $\text{C}_{18}\text{H}_{17}\text{NNaO}_6\text{S}$  ( $\text{M} + \text{Na}^+$ ) 398.0674, found 398.0669; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 14.01$  min,  $t_{\text{minor}} = 17.58$  min,  $ee = 91\%$ ;  $[\alpha]_{\text{D}}^{25} = +57.6$  ( $c = 0.97$  in  $\text{CHCl}_3$ ).



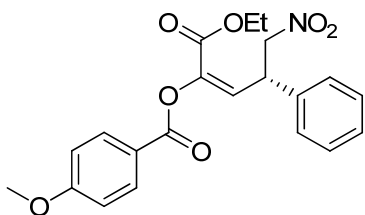
**(*R,E*)-1-ethoxy-4-(nitromethyl)-1-oxohex-2-en-2-yl benzoate (3n)** (Table 3 , entry 14)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.13 (dd,  $J = 8.4, 1.1$  Hz, 2H), 7.66-7.63 (m, 1H), 7.51 (t,  $J = 7.9$  Hz, 2H), 6.43 (d,  $J = 10.1$  Hz, 1H), 4.42 (qd,  $J = 12.3, 7.1$  Hz, 2H), 4.26 (q,  $J = 7.1$  Hz, 2H), 3.31-3.23 (m, 1H), 1.66-1.58 (m, 2H), 1.55-1.46 (m, 1H), 1.28 (t,  $J = 7.1$  Hz, 3H), 0.97 (t,  $J = 7.4$  Hz, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.36, 161.19, 141.25, 133.97, 130.33, 128.67, 128.29, 128.27, 78.18, 61.89, 37.11, 24.75, 14.03, 11.22; HRMS (ESI) calcd for  $\text{C}_{16}\text{H}_{19}\text{NNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 344.1110, found 344.1108; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 16.27$  min,  $t_{\text{minor}} = 16.10$  min,  $ee = 92\%$ ;  $[\alpha]_{\text{D}}^{25} = +9.9$  ( $c = 1.1$  in  $\text{CHCl}_3$ ).



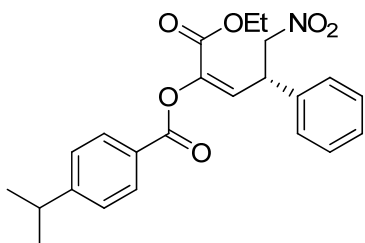
**(*S,E*)-1-methoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl benzoate (3o)** (Table 3 , entry 15)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.11 (dd,  $J = 8.4, 1.4$  Hz, 2H), 7.68-7.64 (m, 1H), 7.52 (t,  $J = 7.7$  Hz, 2H), 7.35-7.22 (m, 5H), 6.78 (d,  $J = 9.5$  Hz, 1H), 4.73 (d,  $J = 7.9$  Hz, 2H), 4.62-4.57 (m, 1H), 3.78 (s, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.12, 161.69, 140.08, 136.44, 134.11, 130.40, 129.35, 128.69, 128.30, 128.04, 127.63, 127.40, 78.42, 52.72, 41.11; HRMS (ESI) calcd for  $\text{C}_{19}\text{H}_{17}\text{NNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 378.0954, found 378.0950; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 18.81$  min,  $t_{\text{minor}} = 23.65$  min,  $ee = 92\%$ ;  $[\alpha]_{\text{D}}^{25} = +94.8$  ( $c = 1.0$  in  $\text{CHCl}_3$ ).



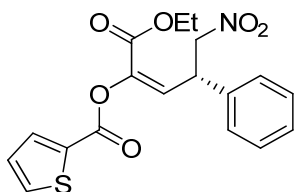
**(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl 4-chlorobenzoate (3p)** (Table 3 , entry 16)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.05-8.02 (m, 2H), 7.48 (dd,  $J = 8.8, 1.9$  Hz, 2H), 7.35-7.26 (m, 3H), 7.23-7.21 (m, 2H), 6.76 (d,  $J = 9.5$  Hz, 1H), 4.72 (d,  $J = 7.6$  Hz, 2H), 4.57 (dd,  $J = 17.2, 7.7$  Hz, 1H), 4.26-4.22 (m, 2H), 1.26 (t,  $J = 7.1$  Hz, 3H).  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  163.32, 161.02, 140.71, 140.30, 136.45, 131.71, 129.38, 129.09, 128.33, 127.41, 127.37, 126.59, 78.47, 62.08, 41.16, 14.02; HRMS (ESI) calcd for  $\text{C}_{20}\text{H}_{18}\text{ClNNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 426.0720, found 426.0718; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 12.85$  min,  $t_{\text{minor}} = 17.95$  min,  $ee = 90\%$ ;  $[\alpha]_{\text{D}}^{25} = +93.2$  ( $c = 1.15$  in  $\text{CHCl}_3$ ).



**(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl 4-methoxybenzoate (3q)** (Table 3 , entry 17)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.07 (d,  $J = 8.8$  Hz, 2H), 7.35-7.22 (m, 7H), 6.98 (d,  $J = 9.1$  Hz, 2H), 6.72 (d,  $J = 9.5$  Hz, 1H), 4.73 (d,  $J = 7.6$  Hz, 2H), 4.62-4.56 (m, 1H), 4.25-4.21 (m, 2H), 3.90 (s, 3H), 1.26 (t,  $J = 7.1$  Hz, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.28, 163.86, 161.36, 140.44, 136.64, 132.56, 129.30, 128.21, 127.42, 126.95, 120.36, 114.36, 113.98, 78.40, 61.92, 55.53, 41.10, 14.01. HRMS (ESI) calcd for  $\text{C}_{21}\text{H}_{21}\text{NNaO}_7$  ( $\text{M} + \text{Na}^+$ ) 422.1216, found 422.1212; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 25.21$  min,  $t_{\text{minor}} = 41.90$  min,  $ee = 94\%$ ;  $[\alpha]_{\text{D}}^{25} = +84.1$  ( $c = 1.03$  in  $\text{CHCl}_3$ ).

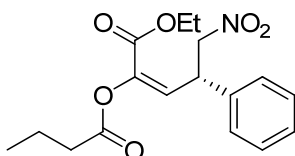


**(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl 4-isopropylbenzoate (3r)** (Table 3 , entry 18)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  8.05-8.04 (m, 2H), 7.32 (dddd,  $J = 35.0, 29.0, 9.8, 4.9$  Hz, 7H), 6.73 (d,  $J = 9.5$  Hz, 1H), 4.73 (d,  $J = 7.9$  Hz, 2H), 4.62-4.57 (m, 1H), 4.25-4.21 (m, 2H), 3.01 (dt,  $J = 13.6, 6.8$  Hz, 1H), 1.30 (d,  $J = 6.9$  Hz, 6H), 1.25 (t,  $J = 7.1$  Hz, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  164.18, 161.27, 155.71, 140.40, 136.59, 130.57, 129.30, 129.06, 129.01, 128.22, 127.41, 127.01, 126.82, 125.67, 78.37, 61.92, 41.08, 34.36, 23.62, 14.01; HRMS (ESI) calcd for  $\text{C}_{23}\text{H}_{25}\text{NNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 434.1580, found 434.1571; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 12.98$  min,  $t_{\text{minor}} = 21.56$  min,  $ee = 92\%$ ;  $[\alpha]_{\text{D}}^{25} = +113.2$  ( $c = 1.07$  in  $\text{CHCl}_3$ ).



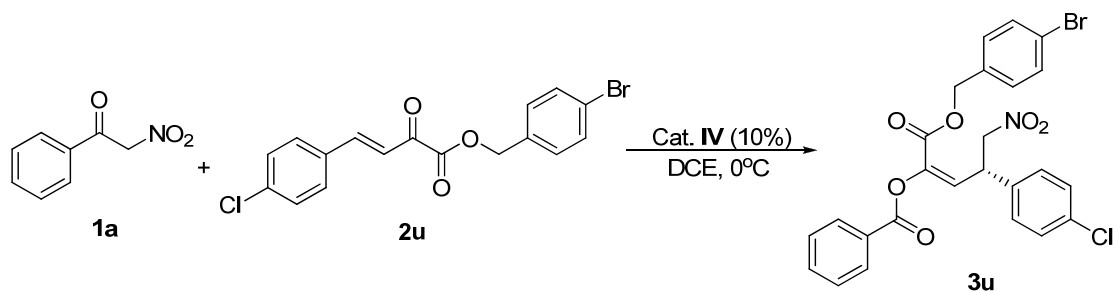
**(*S,E*)-1-ethoxy-5-nitro-1-oxo-4-phenylpent-2-en-2-yl thiophene-2-carboxylate (3s)** (Table 3 , entry 19)

$^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.94 (dd,  $J = 3.8, 1.3$  Hz, 1H), 7.70 (dd,  $J = 4.9, 1.1$  Hz, 1H), 7.36-7.23 (m, 6H), 7.19 (dd,  $J = 4.9, 3.9$  Hz, 1H), 6.74 (d,  $J = 9.5$  Hz, 1H), 4.74 (d,  $J = 7.6$  Hz, 2H), 4.60 (dd,  $J = 17.2, 7.7$  Hz, 1H), 4.24 (q,  $J = 7.3$  Hz, 2H), 1.27 (t,  $J = 7.1$  Hz, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  161.07, 159.39, 139.96, 136.46, 135.47, 134.31, 131.09, 129.34, 129.15, 128.30, 128.21, 127.50, 127.45, 78.30, 62.06, 41.12, 14.02; HRMS (ESI) calcd for  $\text{C}_{18}\text{H}_{17}\text{NNaO}_6\text{S}$  ( $\text{M} + \text{Na}^+$ ) 398.0674, found 398.0668; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 18.82$  min,  $t_{\text{minor}} = 13.03$  min,  $ee = 90\%$ ;  $[\alpha]_{\text{D}}^{25} = +10.4$  ( $c = 0.33$  in  $\text{CHCl}_3$ ).



**(*S,E*)-ethyl 2-(butyryloxy)-5-nitro-4-phenylpent-2-enoate (3t)** (Table 3 , entry 20)  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ )  $\delta$  7.38-7.22 (m, 5H), 6.62 (d,  $J = 9.5$  Hz, 1H), 4.68 (qd,  $J = 12.6, 7.6$  Hz, 2H), 4.54-5.49 (m, 1H), 4.22 (q,  $J = 7.1$  Hz, 2H), 2.55-2.45 (m, 2H), 1.75 (h,  $J = 7.4$  Hz, 2H), 1.28 (t,  $J = 7.1$  Hz, 3H), 1.03 (t,  $J = 7.4$  Hz, 3H);  $^{13}\text{C}$  NMR (125 MHz,  $\text{CDCl}_3$ )  $\delta$  171.10, 161.23, 140.21, 136.63, 129.34, 128.28, 127.39, 126.75, 78.39, 61.92, 41.04, 35.46, 18.25, 14.02, 13.57. HRMS (ESI) calcd for  $\text{C}_{17}\text{H}_{21}\text{NNaO}_6$  ( $\text{M} + \text{Na}^+$ ) 358.1267, found 358.1259; HPLC (Chiralpak IC, *i*-propanol/hexane = 20/80, flow rate 1.0 mL/min,  $\lambda = 254$  nm):  $t_{\text{major}} = 17.98$  min,  $t_{\text{minor}} = 21.03$  min,  $ee = 75\%$ ;  $[\alpha]_{\text{D}}^{25} = +36.6$  ( $c = 0.9$  in  $\text{CHCl}_3$ ).

## 5. Preparation of the Compound 3u for X-ray Crystallographic Analysis

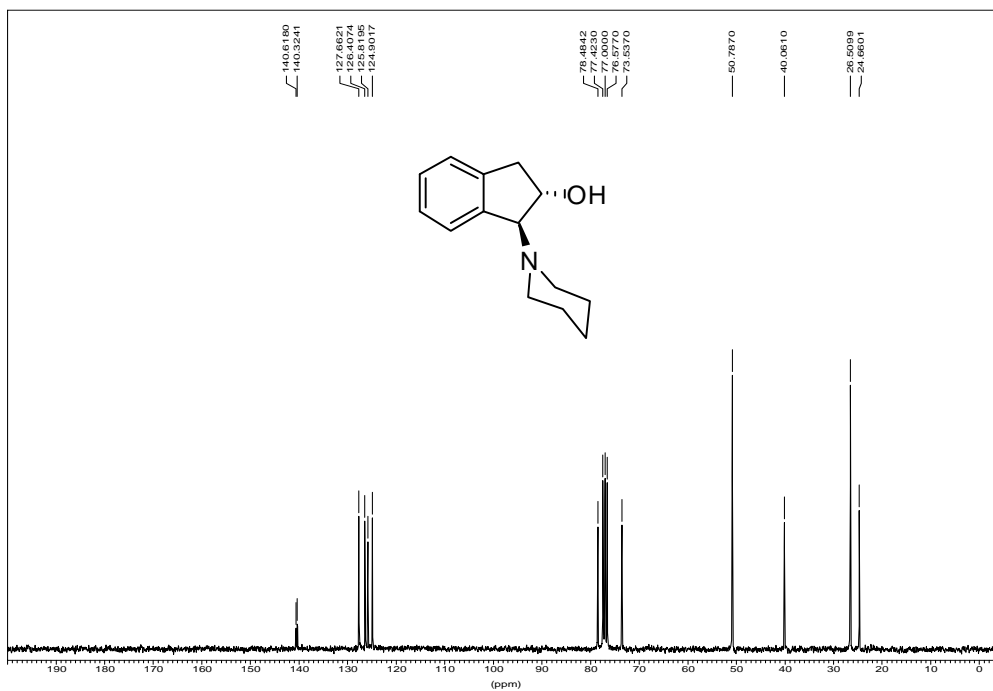
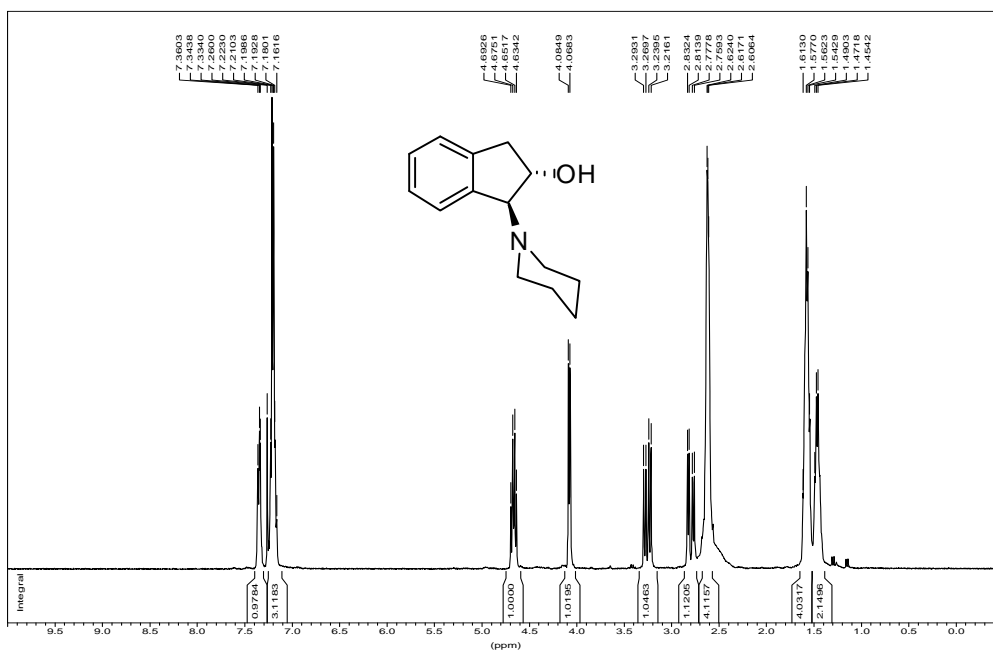


To a solution of Benzoylnitromethane **1a** (33.0 mg, 0.2 mmol) in 0.90 mL DCE was added (*E*)-4-bromobenzyl 4-(4-chlorophenyl)-2-oxobut-3-enoate **2u** (83.5 mg, 0.22 mmol) at 0°C, followed by adding of 100 μL of pre-cooled catalyst **IV** solution (9.8 mg in 100 μL DCE, 0.02 mmol). The mixture was stirred at 0°C for 24 h. The crude product was purified by column chromatography on silica gel, eluted by hexane/EtOAc= 5:1 to afford 88.3 mg (81% yield) of the desired product **3u** as white solid. <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) δ 8.08 (dd, *J* = 8.3, 1.2 Hz, 2H), 7.66 (d, *J* = 7.5 Hz, 1H), 7.52 (t, *J* = 7.8 Hz, 2H), 7.47 - 7.41 (m, 2H), 7.32 - 7.27 (m, 2H), 7.21 - 7.11 (m, 4H), 6.73 (d, *J* = 9.4 Hz, 1H), 5.21 - 5.10 (m, 2H), 4.72 - 4.68 (m, 2H), 4.61 - 4.54 (m, 1H); <sup>13</sup>C NMR (75 MHz, CDCl<sub>3</sub>) δ 164.13, 160.85, 140.27, 134.80, 134.33, 134.29, 133.86, 131.72, 130.34, 129.88, 129.55, 128.77, 127.77, 127.32, 122.57, 78.05, 66.83, 40.50.

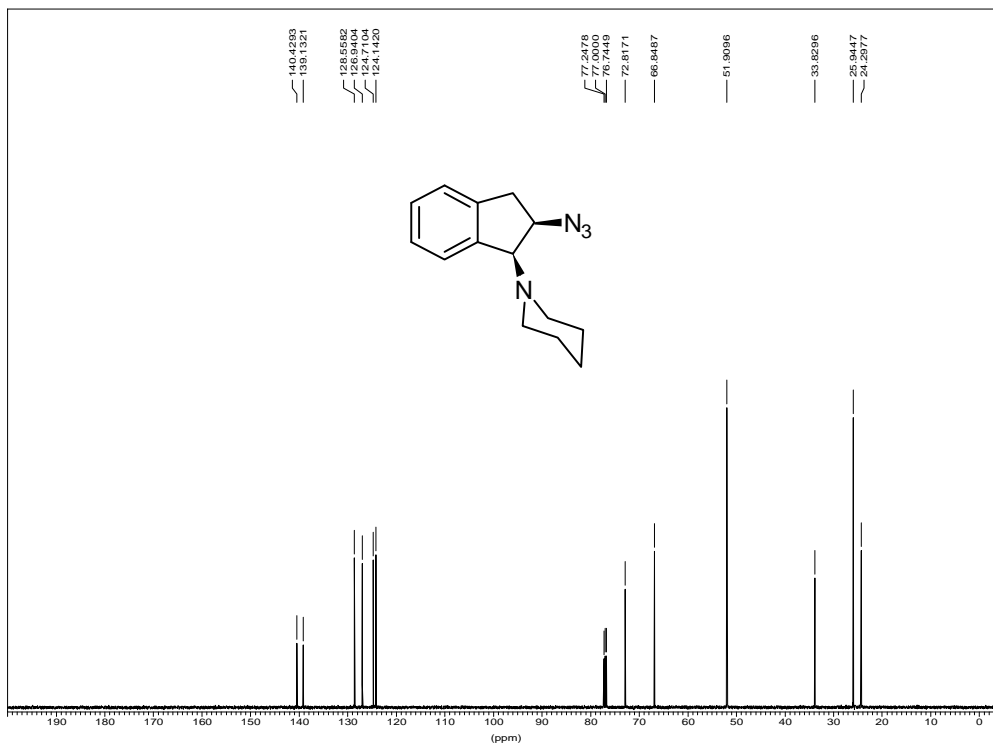
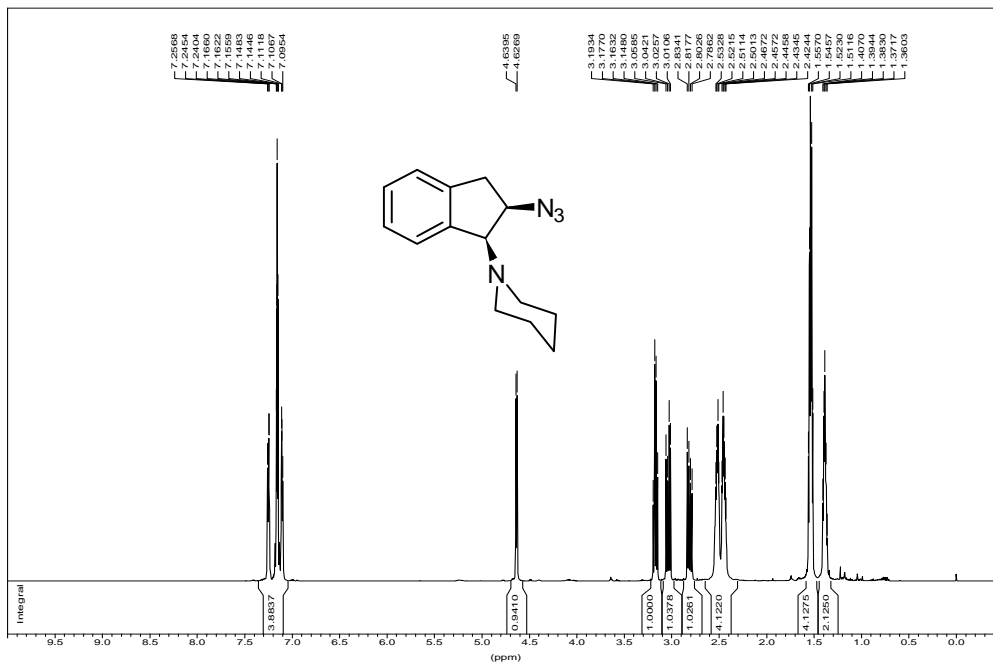
#### 6. HPLC chromatogram profile and NMR spectra of the products



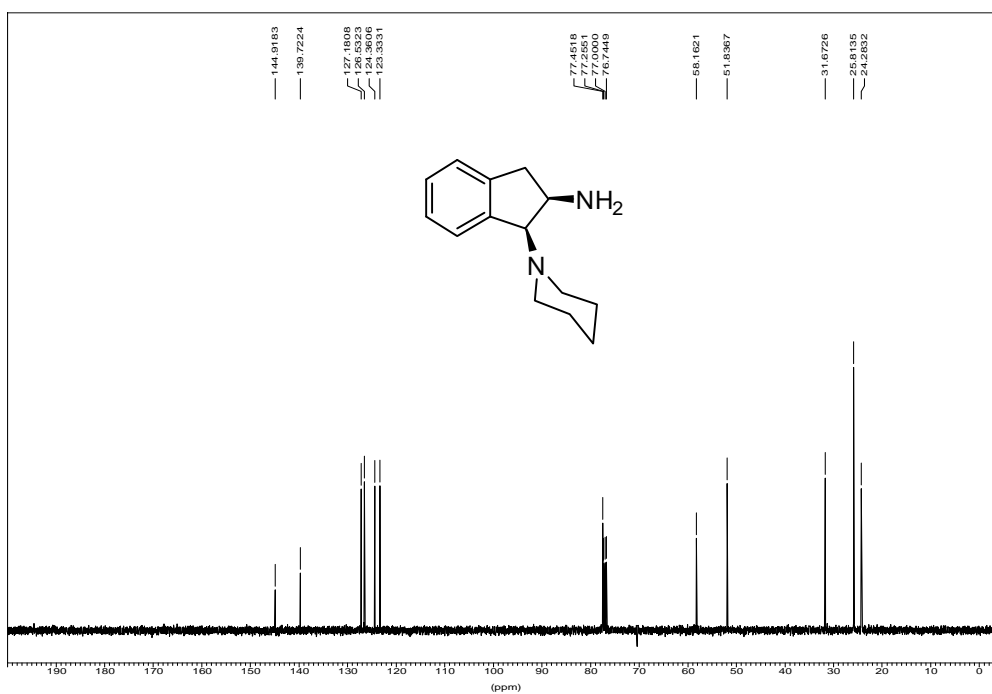
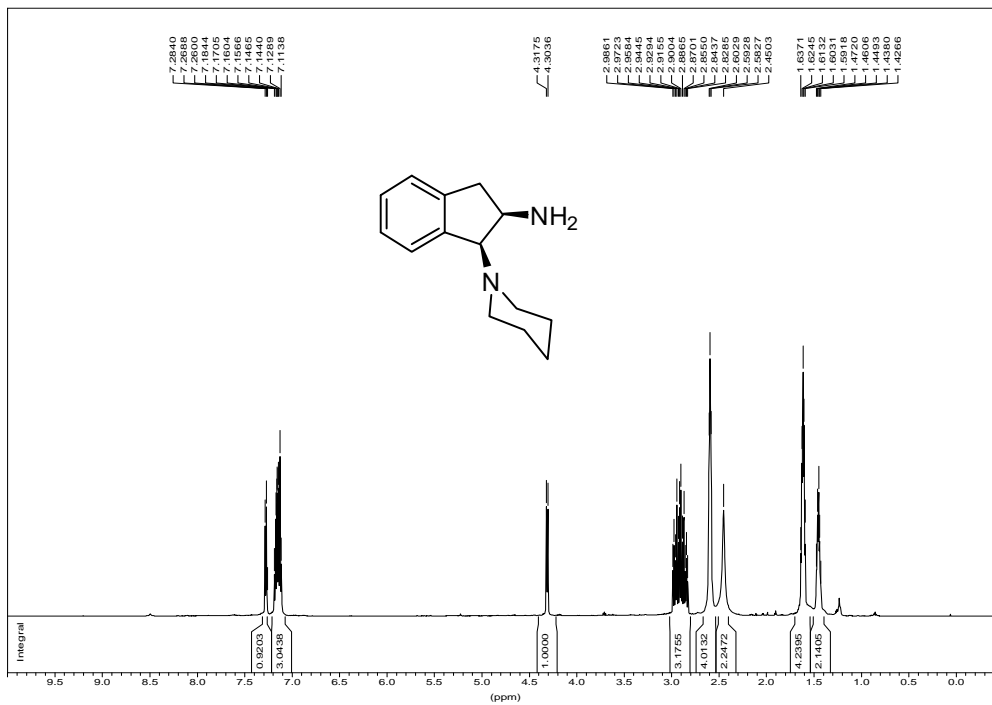
Compound **b**



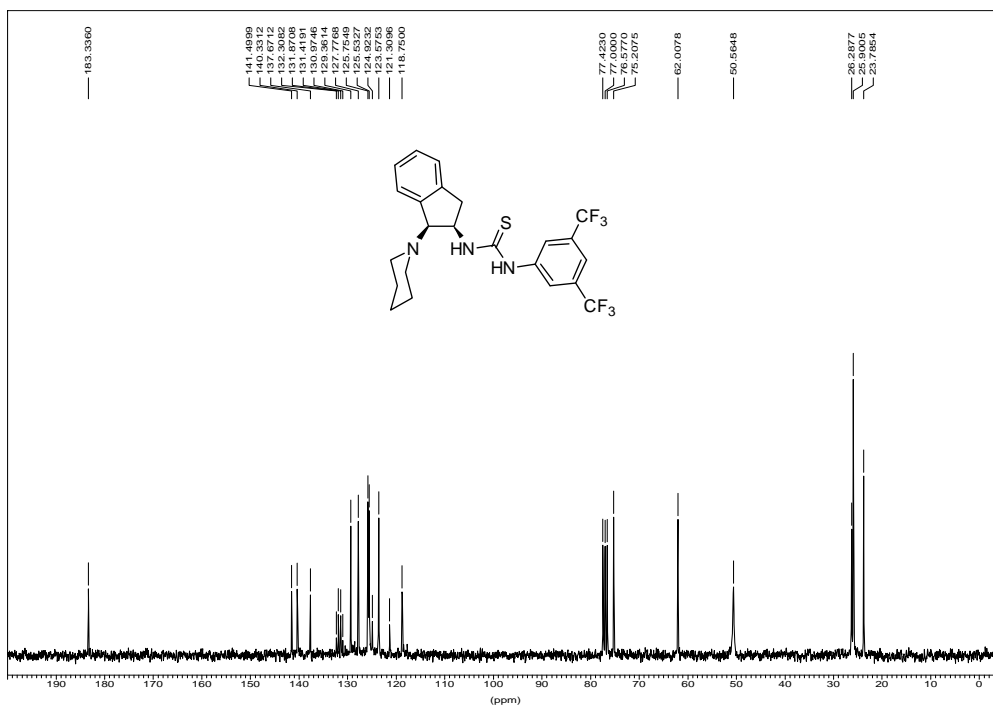
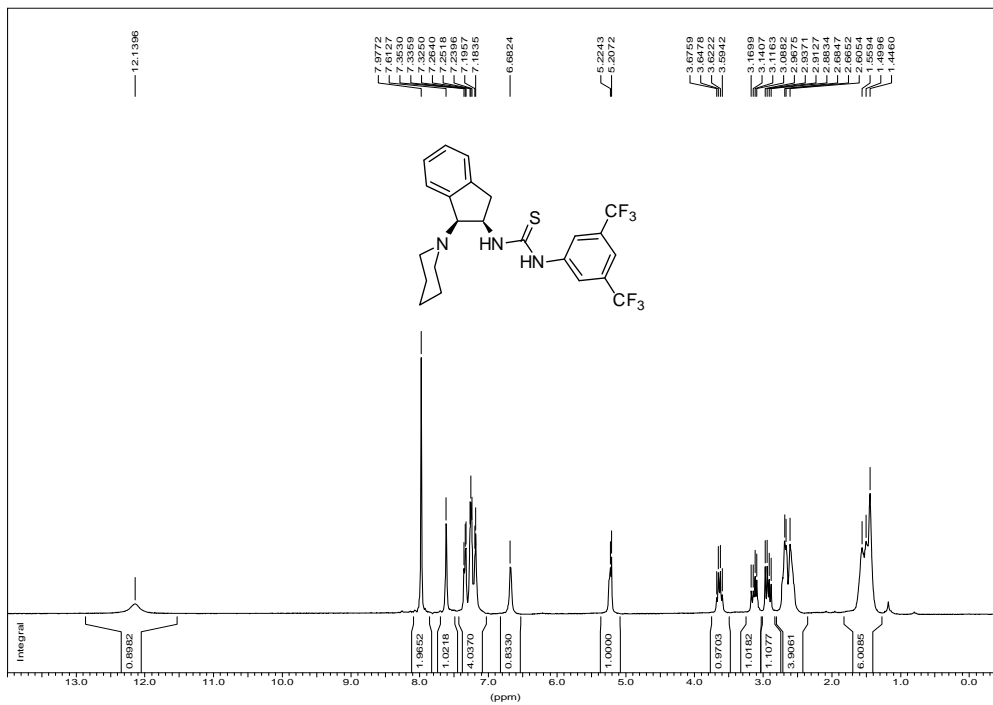
Compound **c**



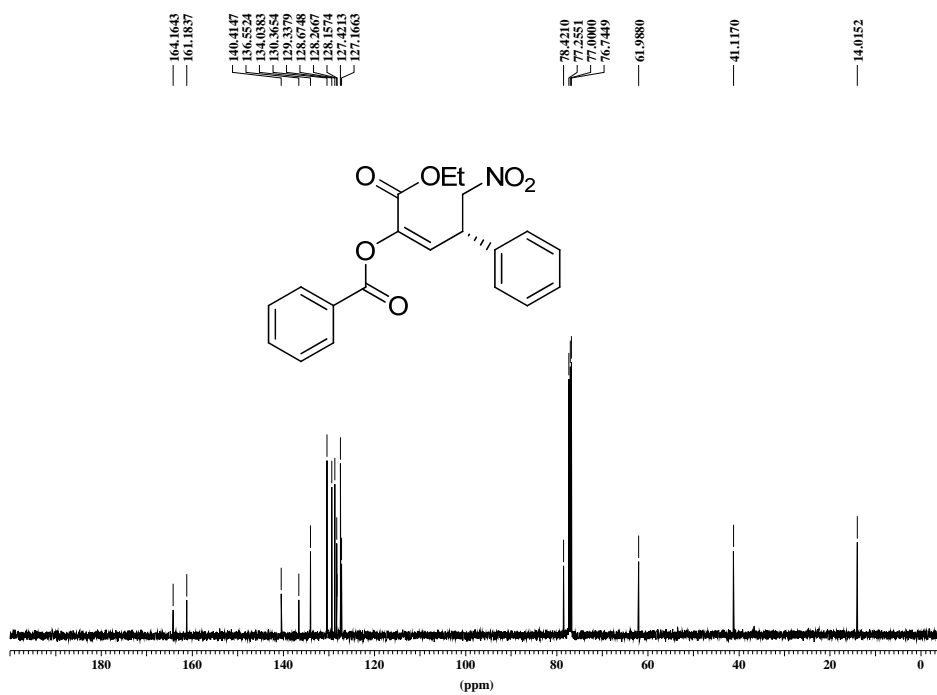
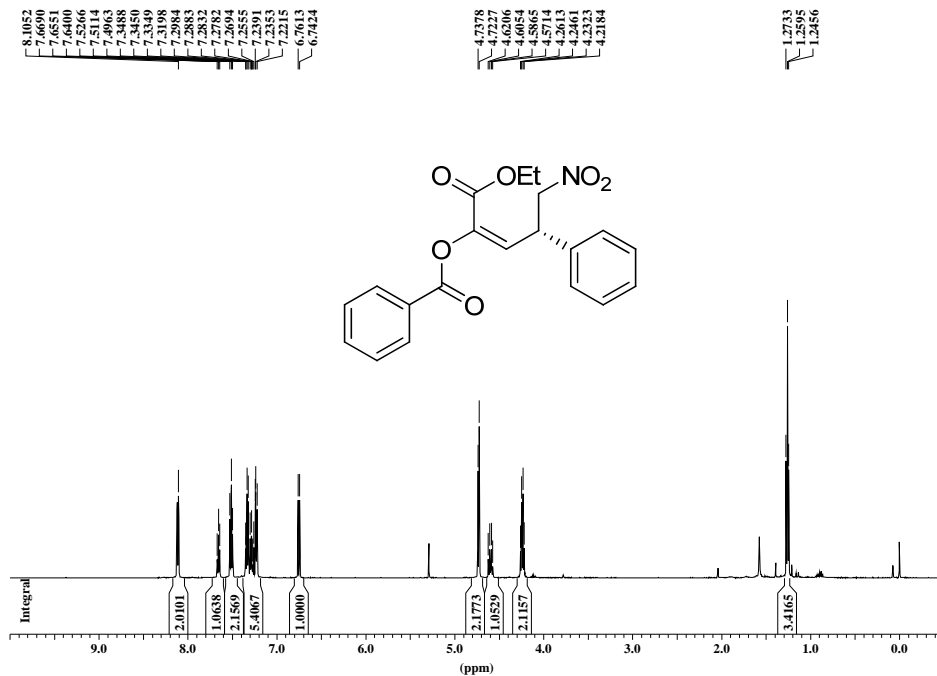
Compound **d**



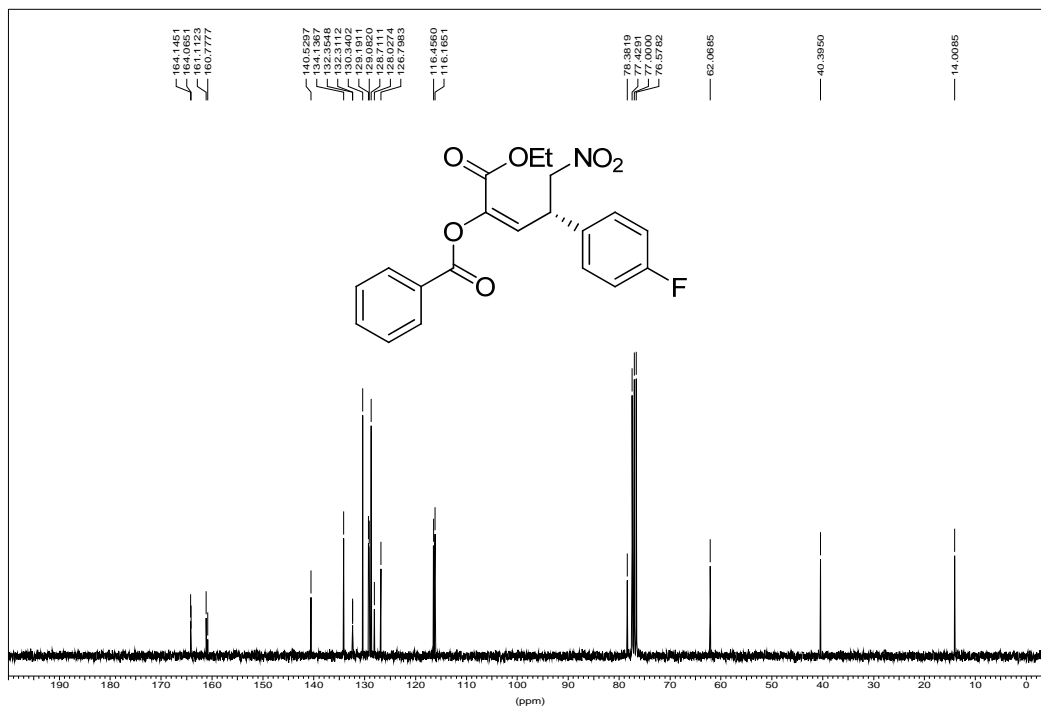
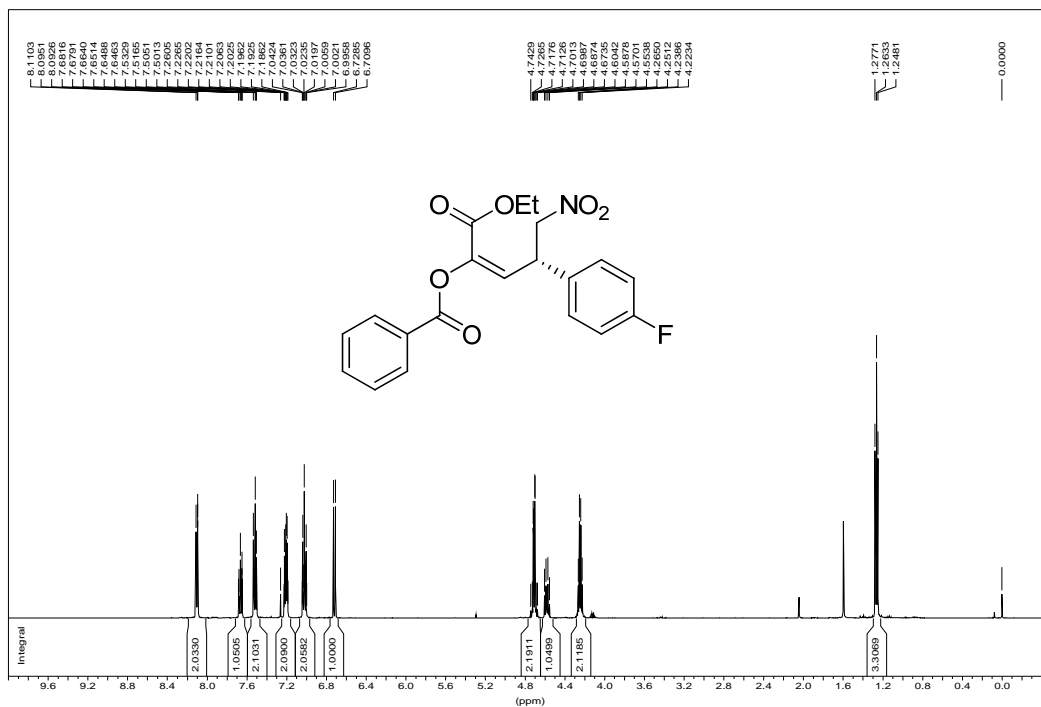
Compound IV



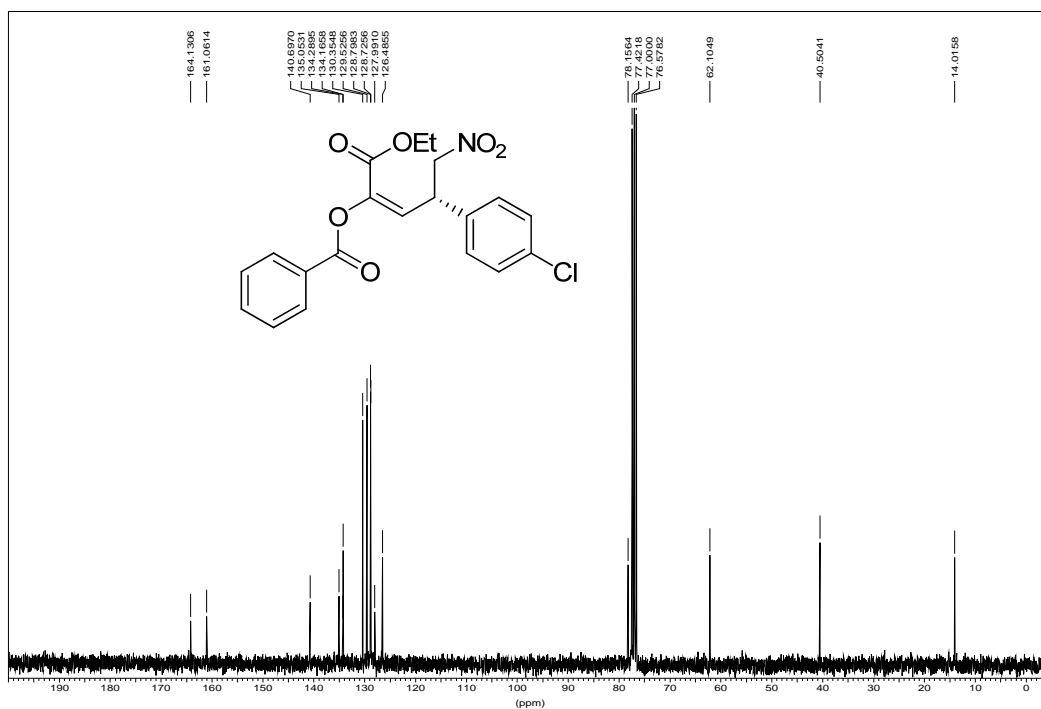
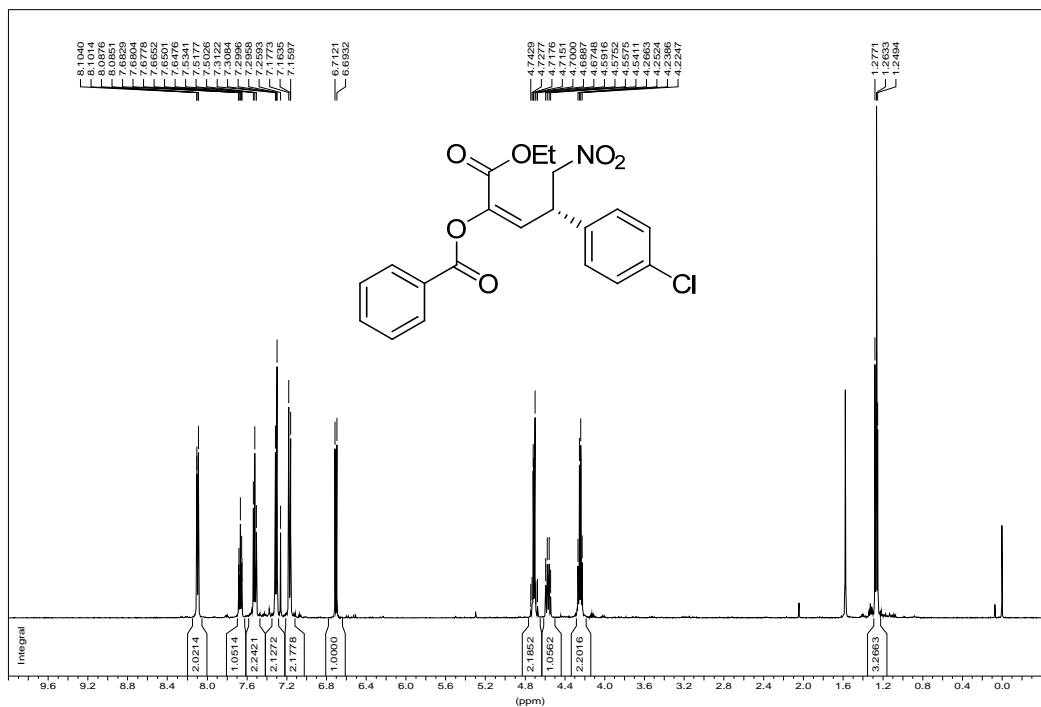
Compound **3a**



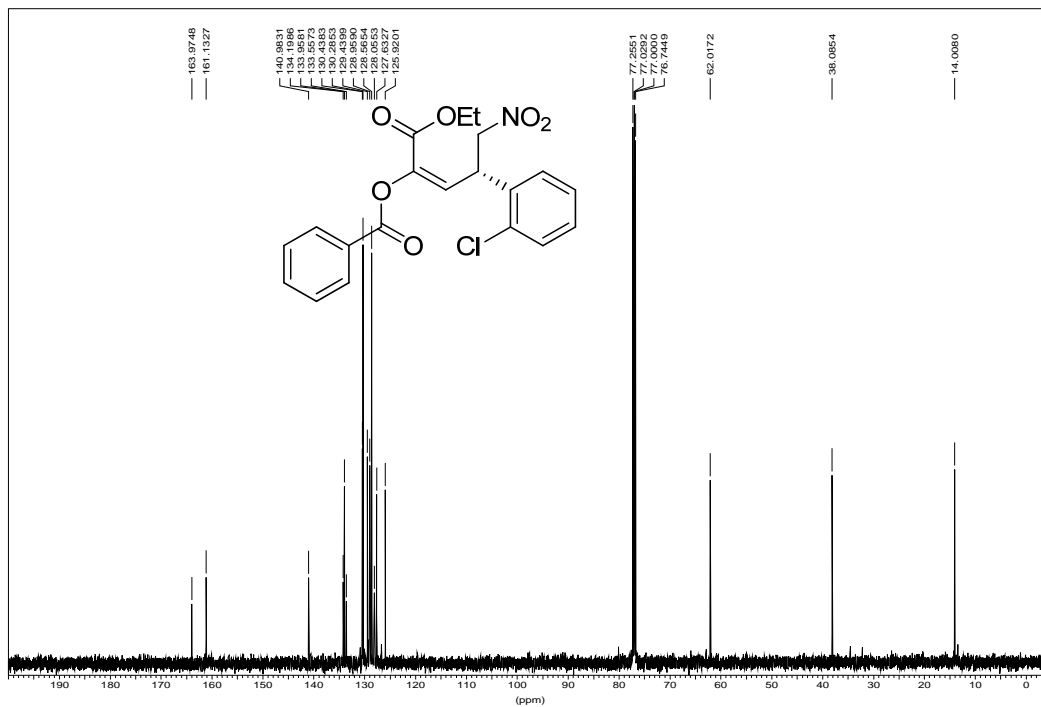
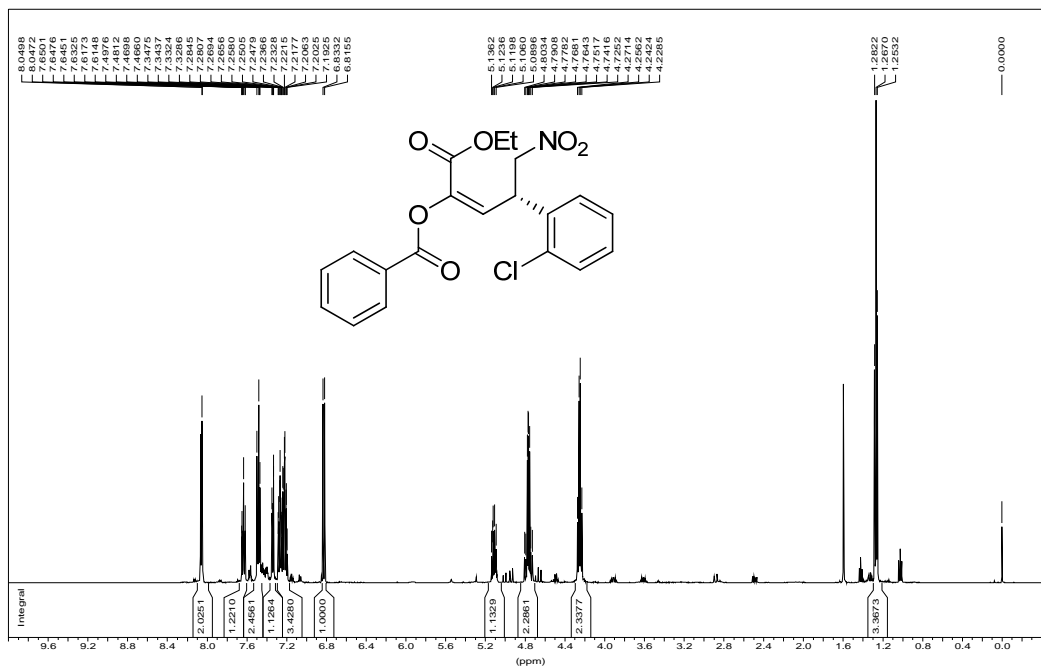
Compound **3b**



Compound **3c**

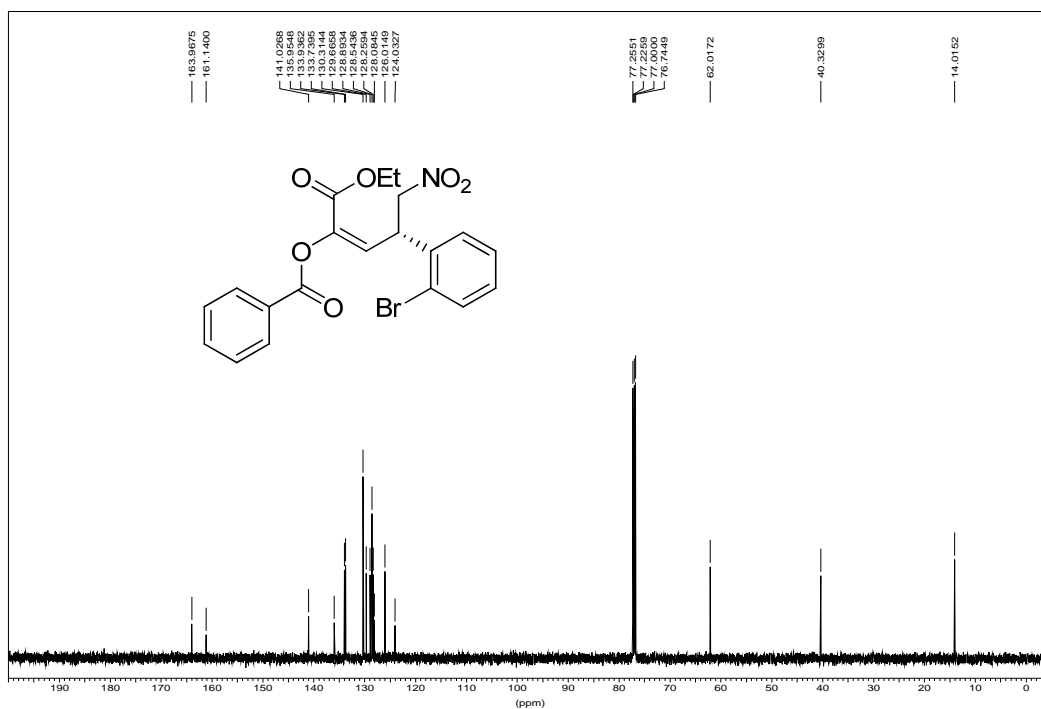
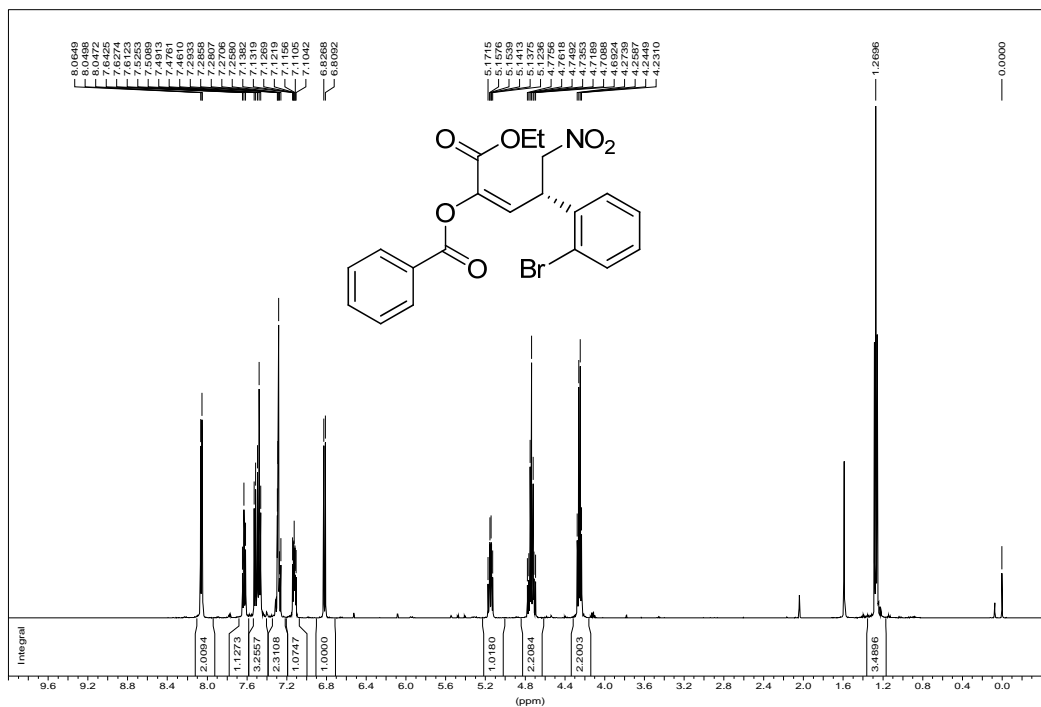


Compound **3d**

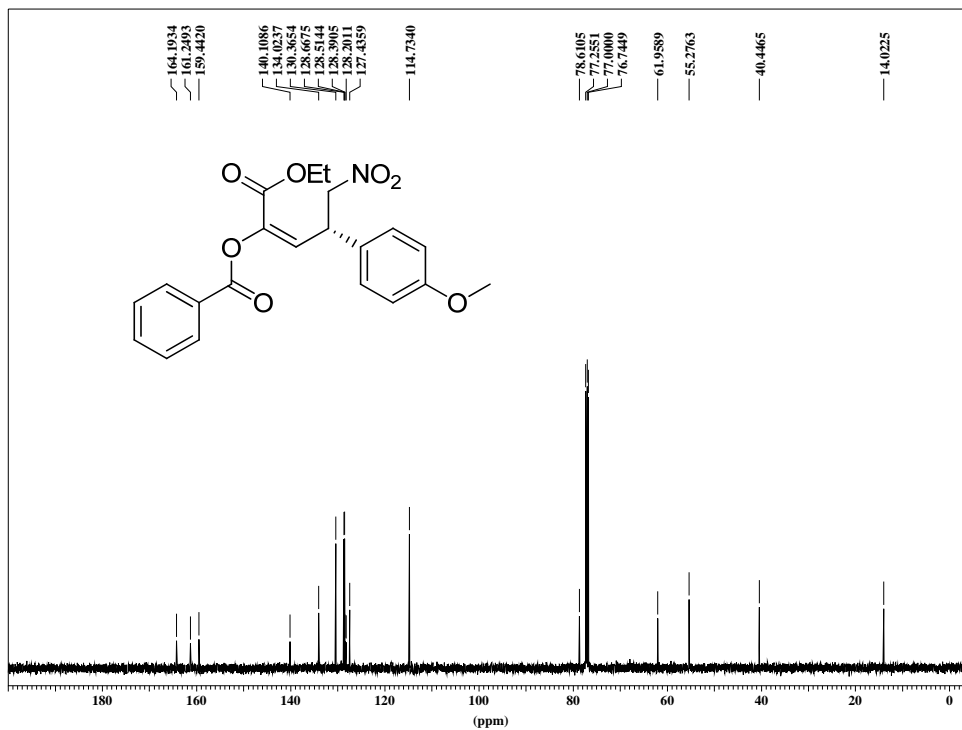




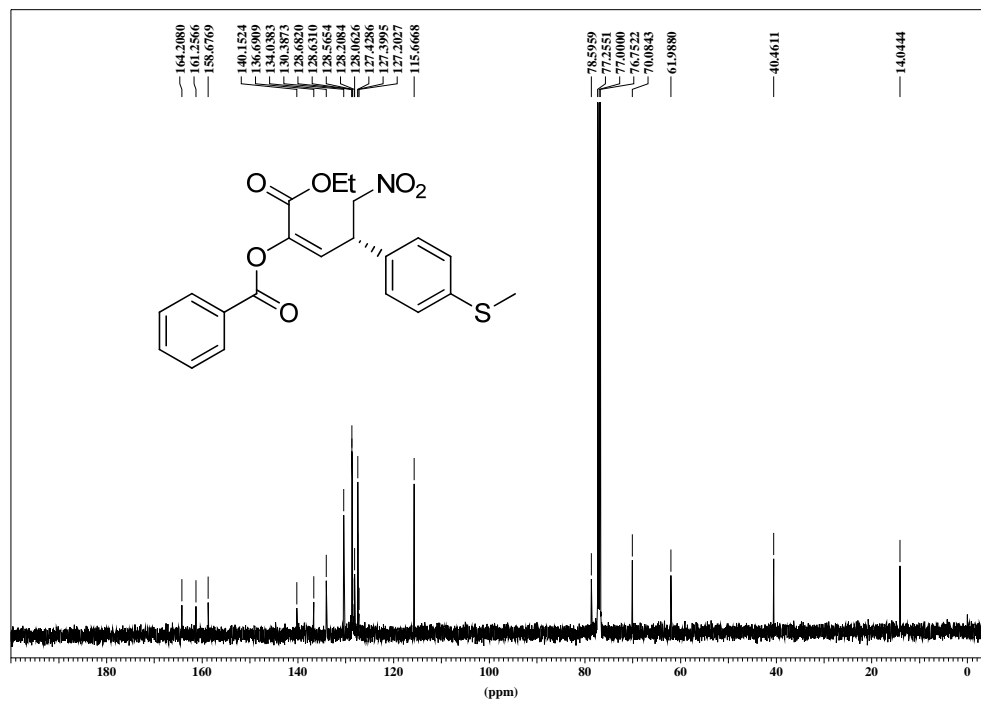
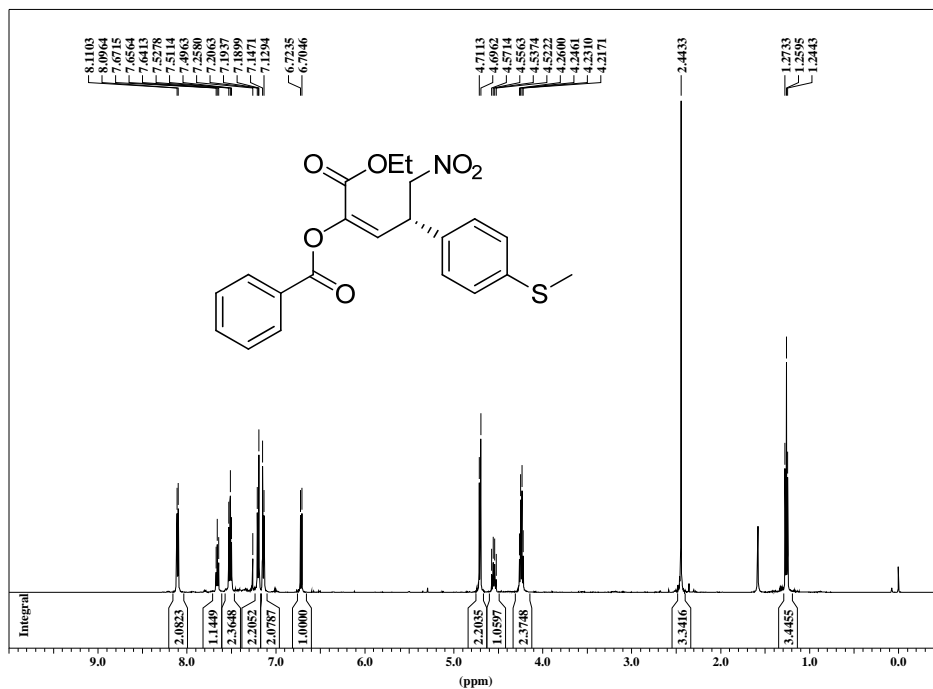
Compound **3e**



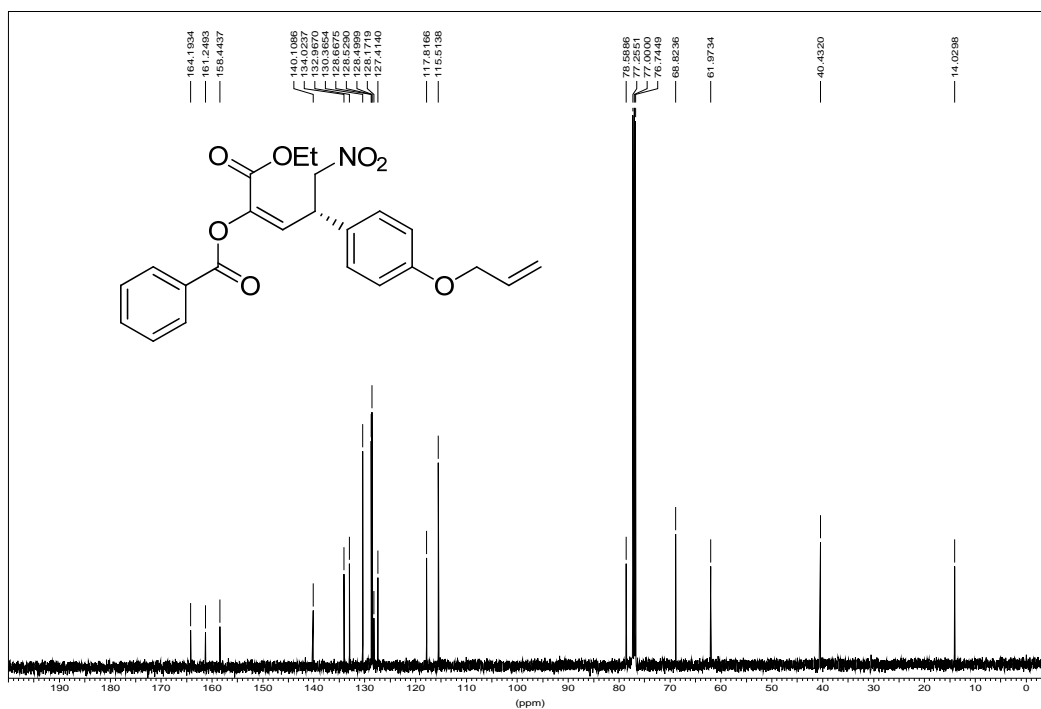
Compound **3f**



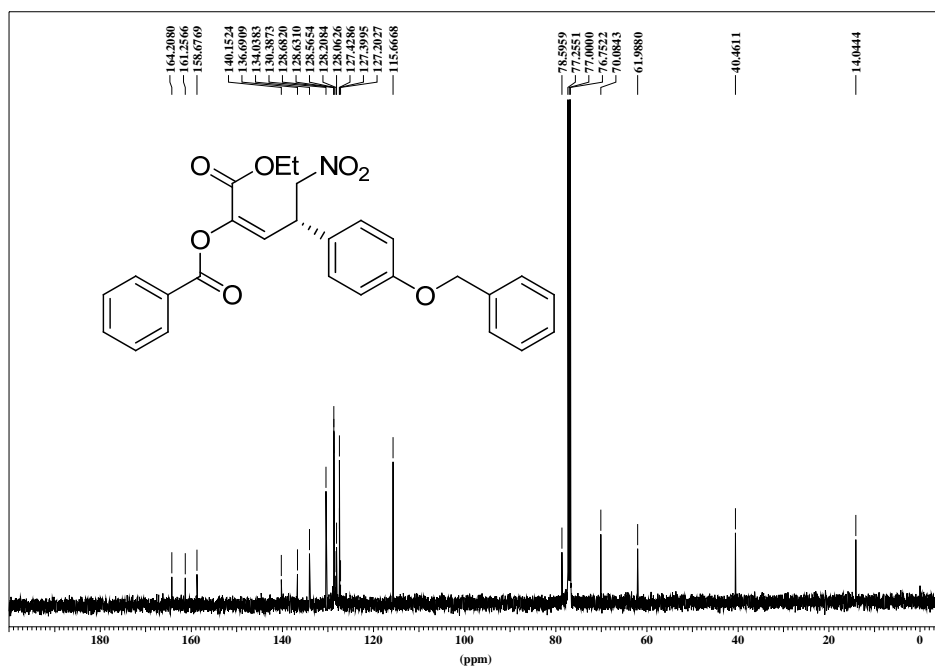
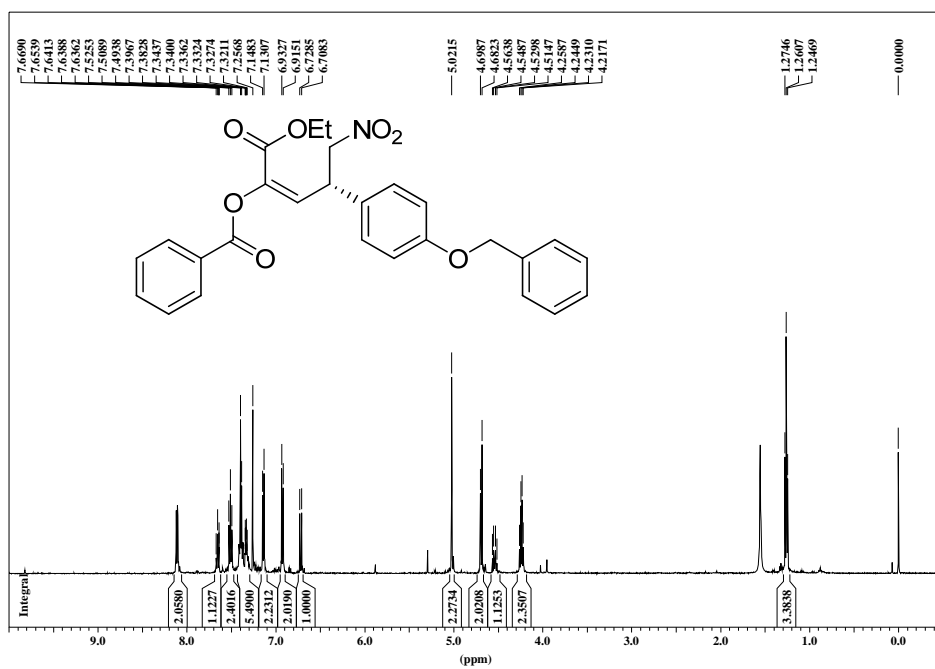
Compound **3g**



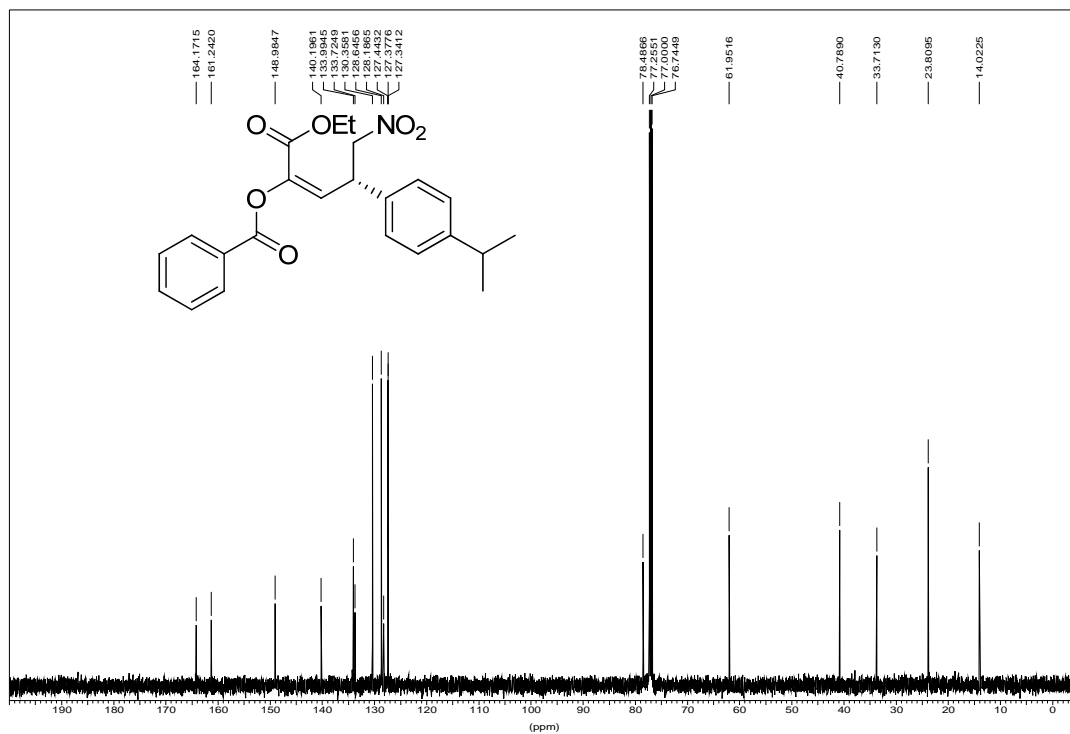
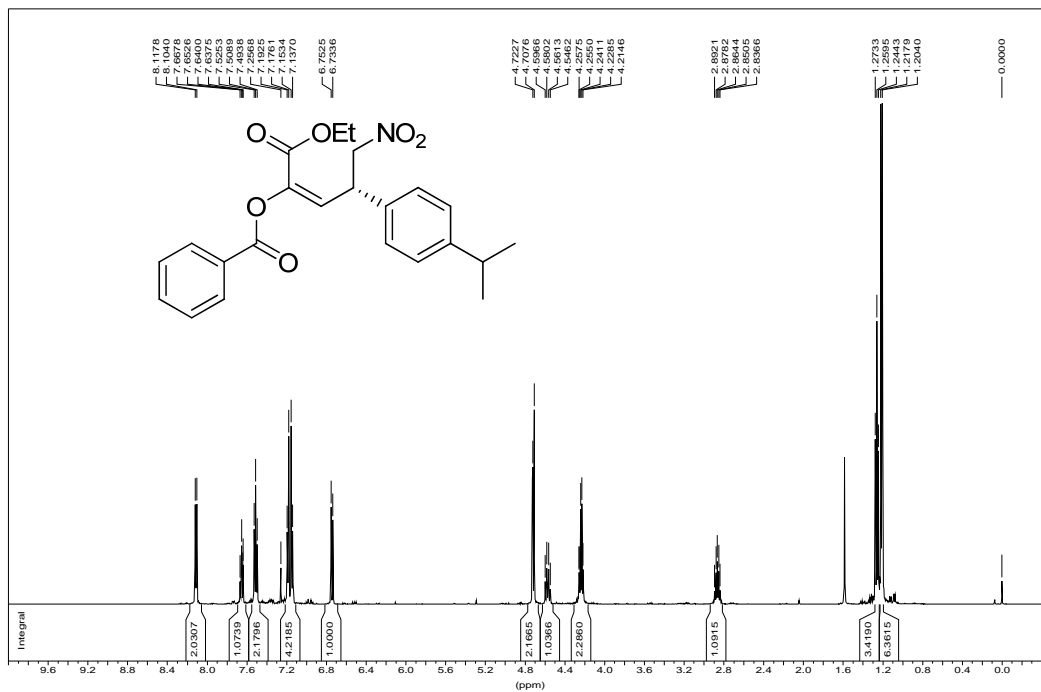
Compound **3h**



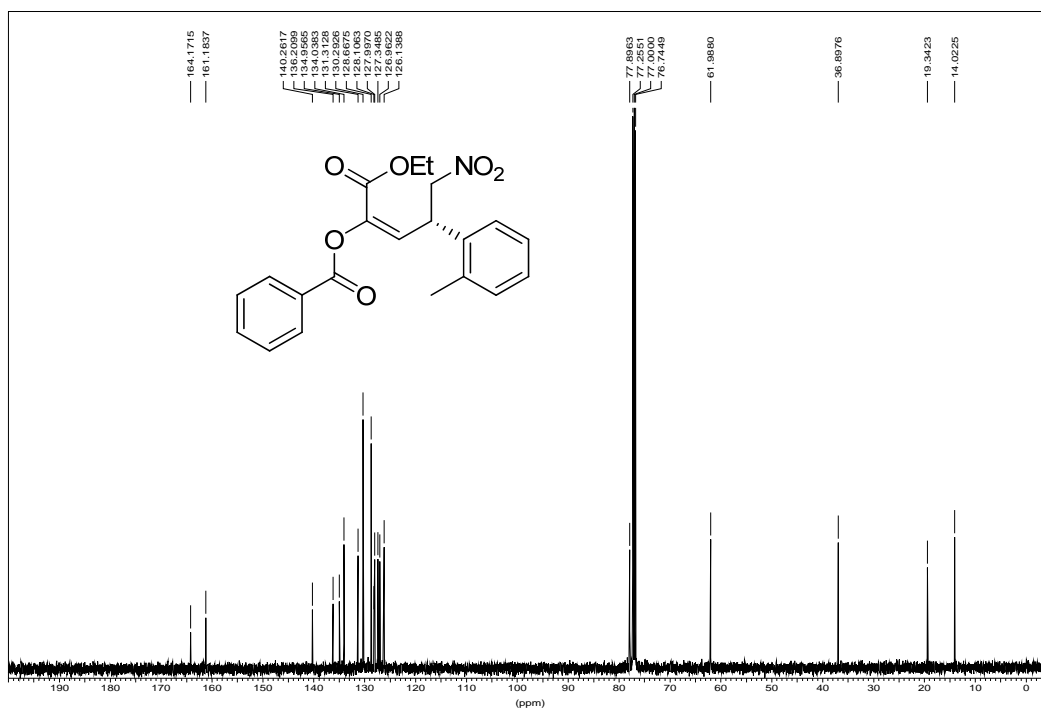
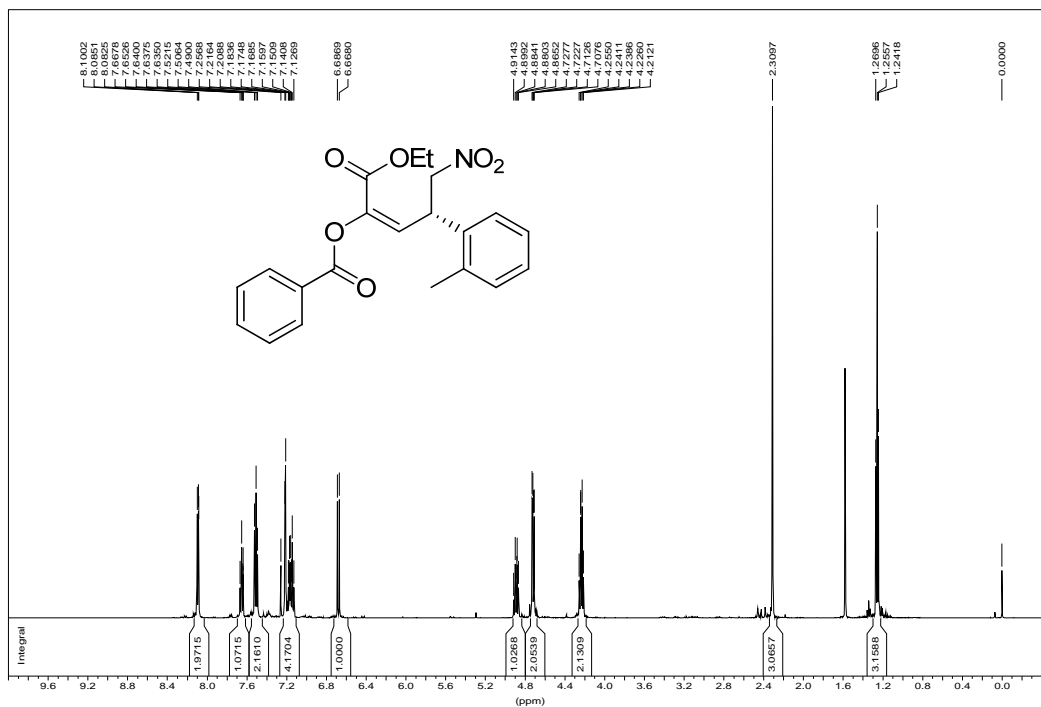
Compound **3i**



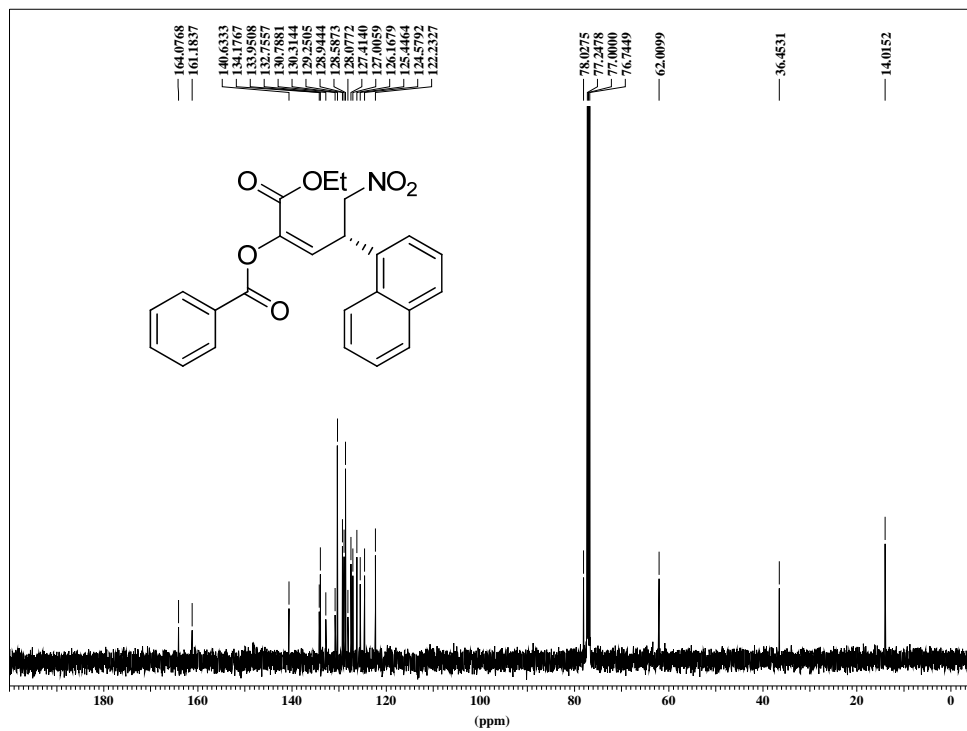
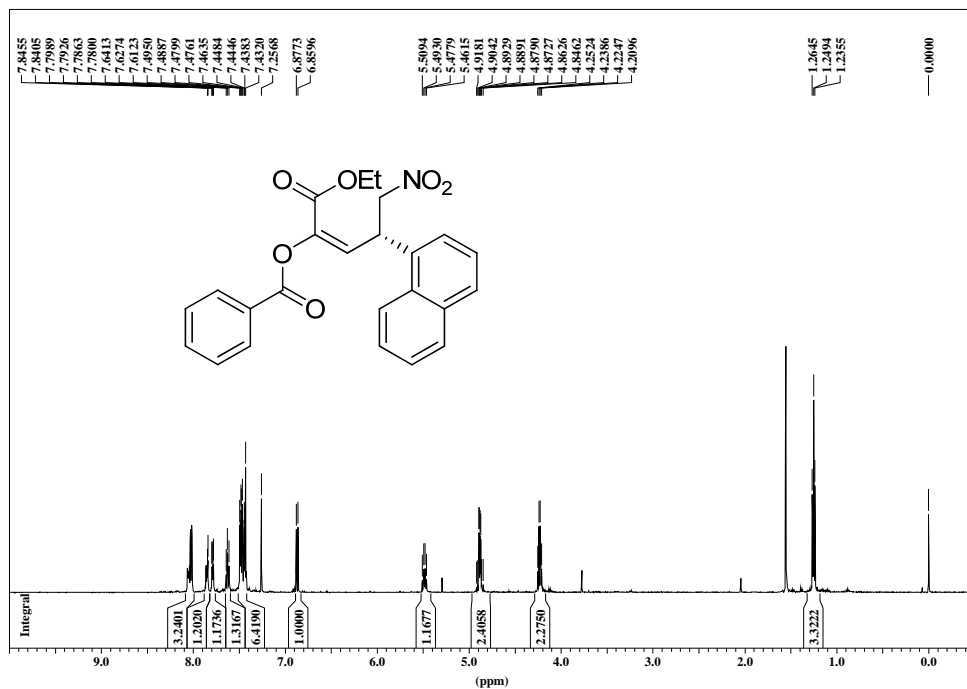
Compound **3j**



Compound **3k**

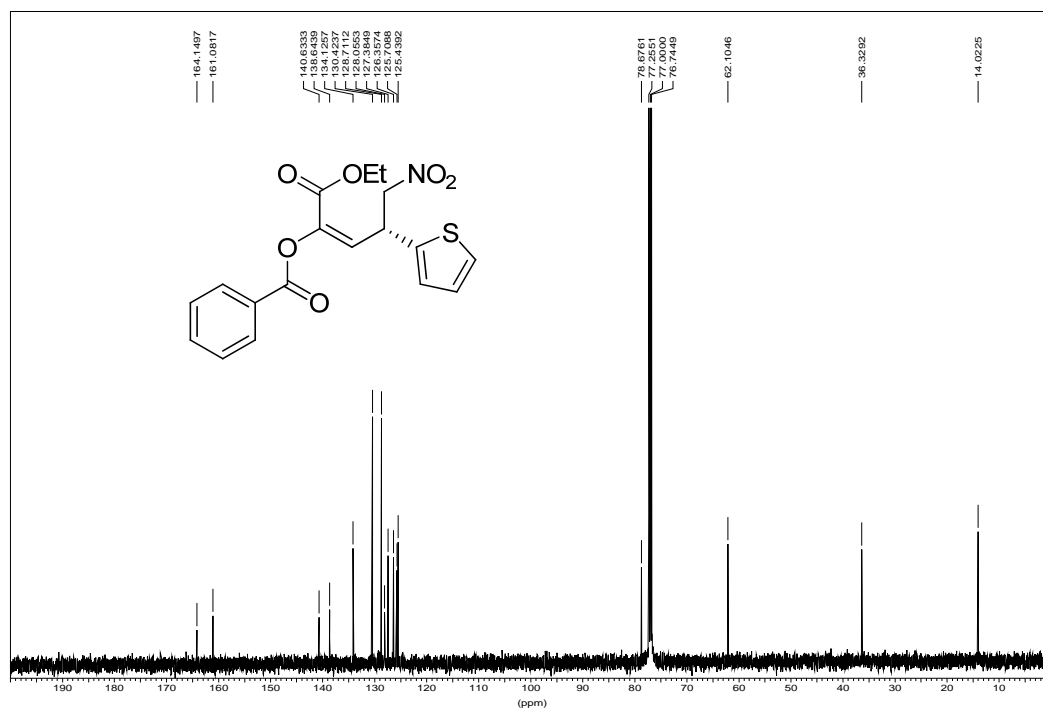
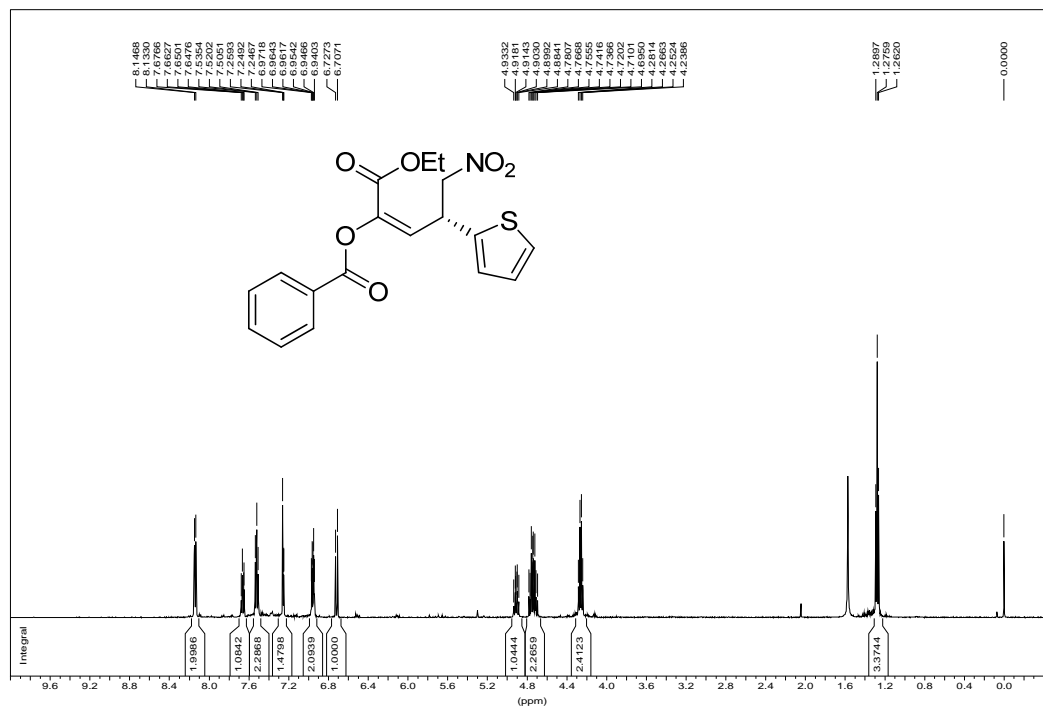


Compound **3I**

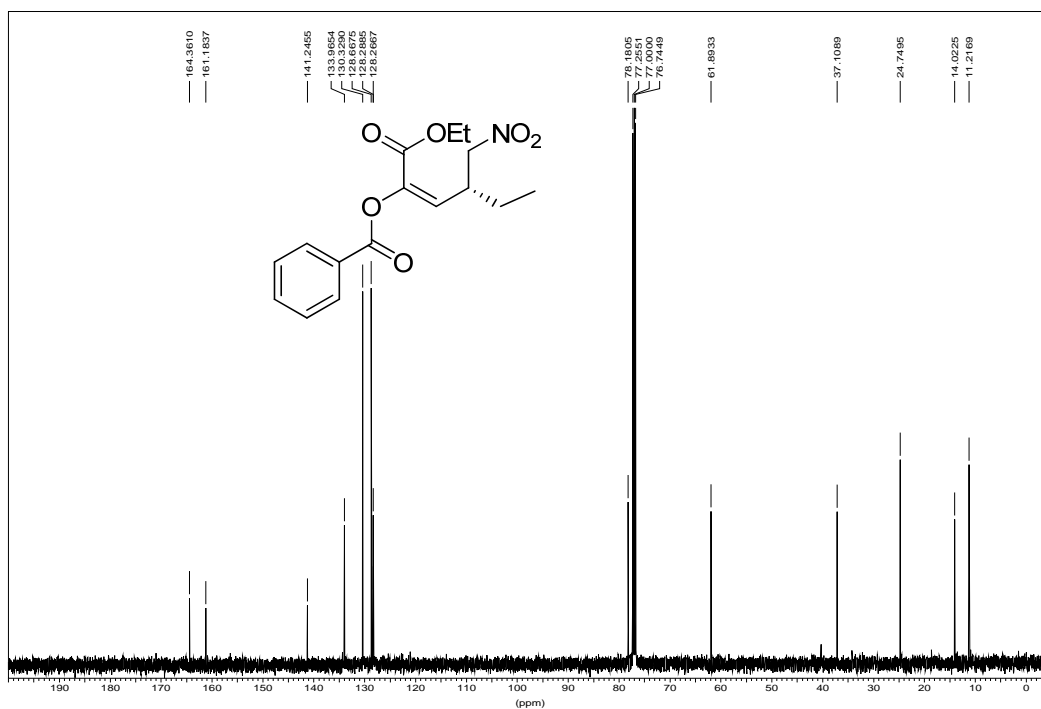




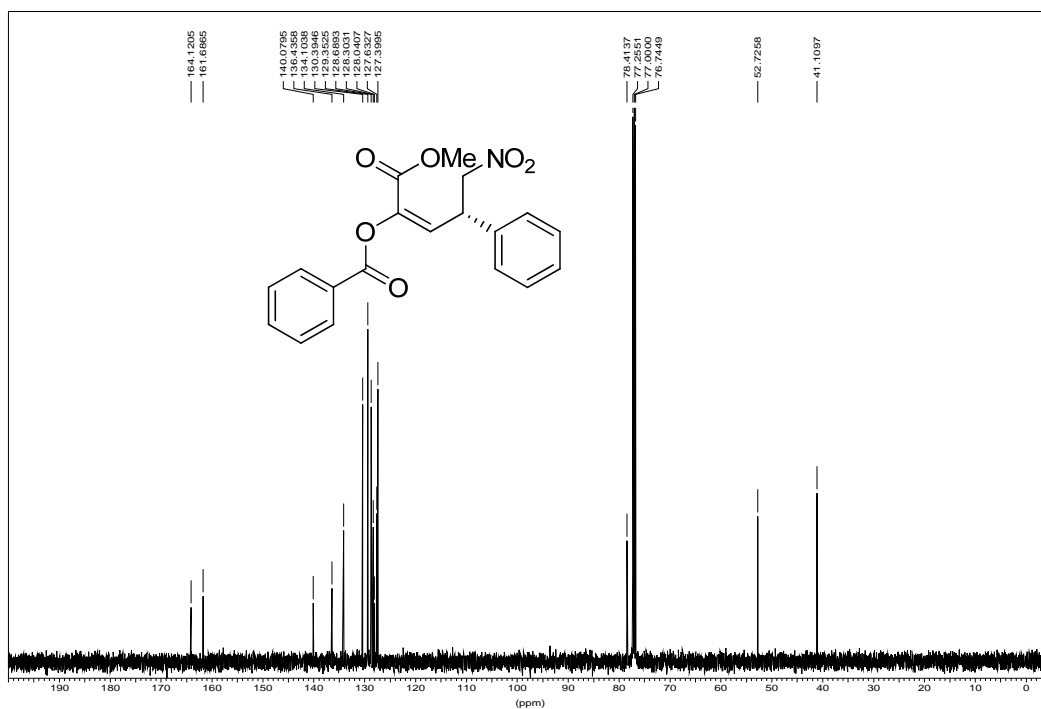
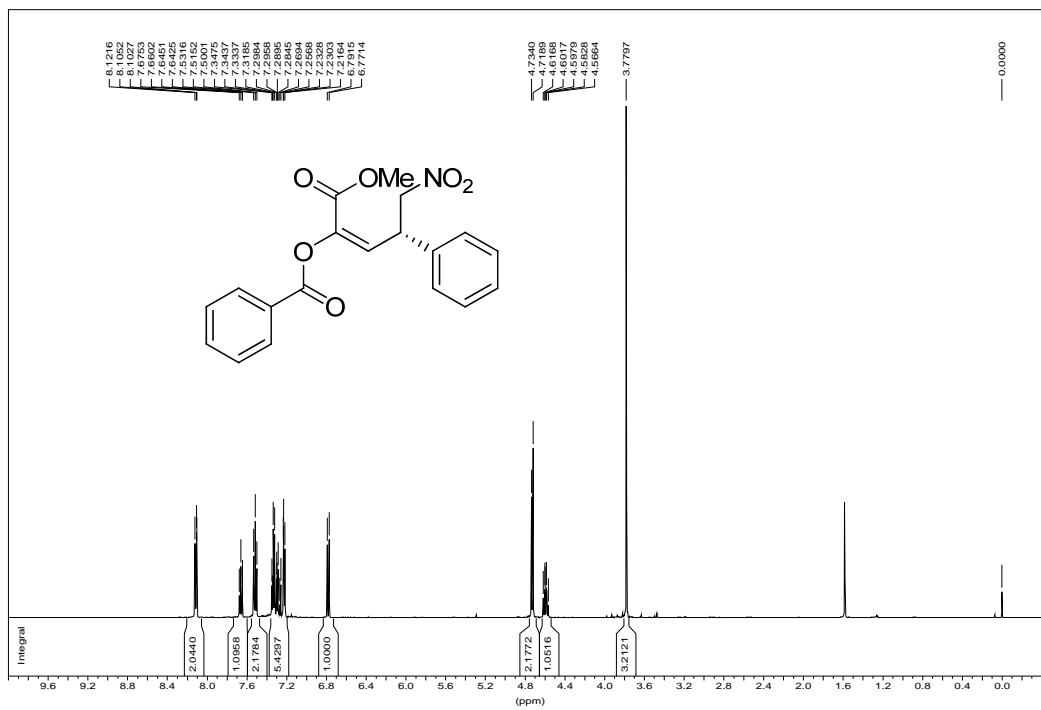
Compound **3m**



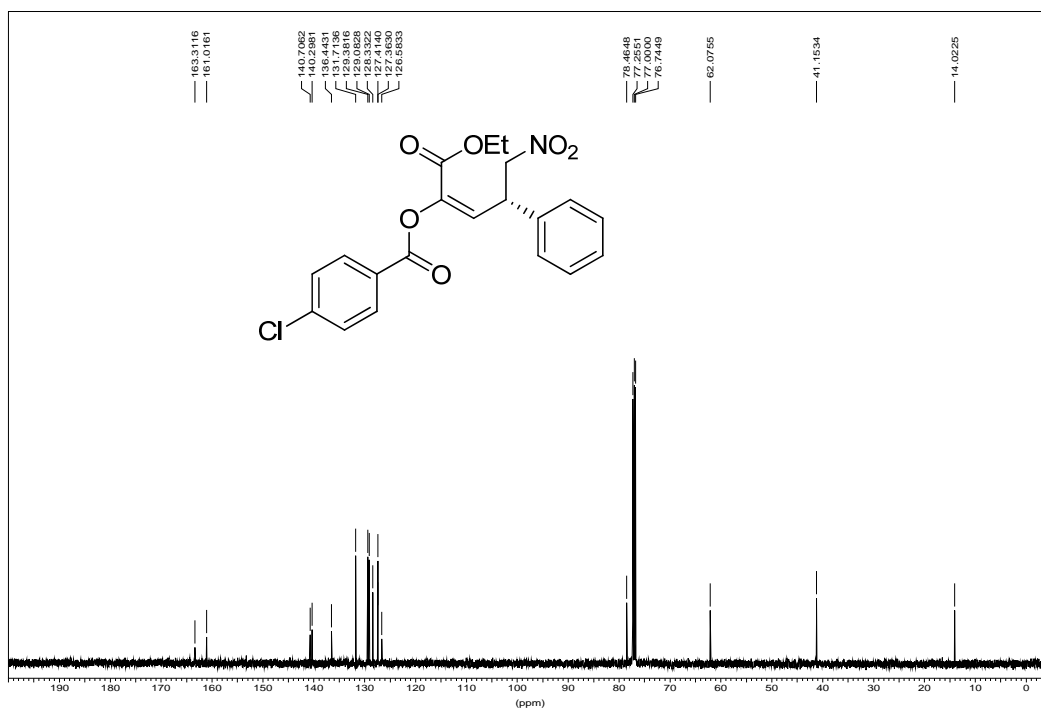
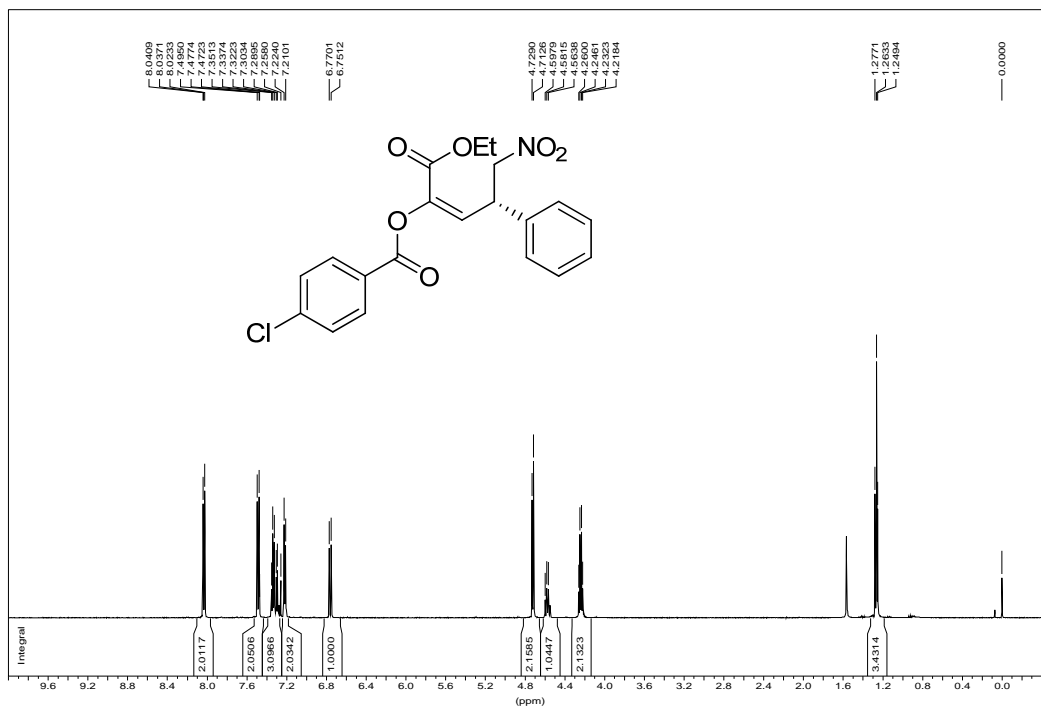
Compound **3n**



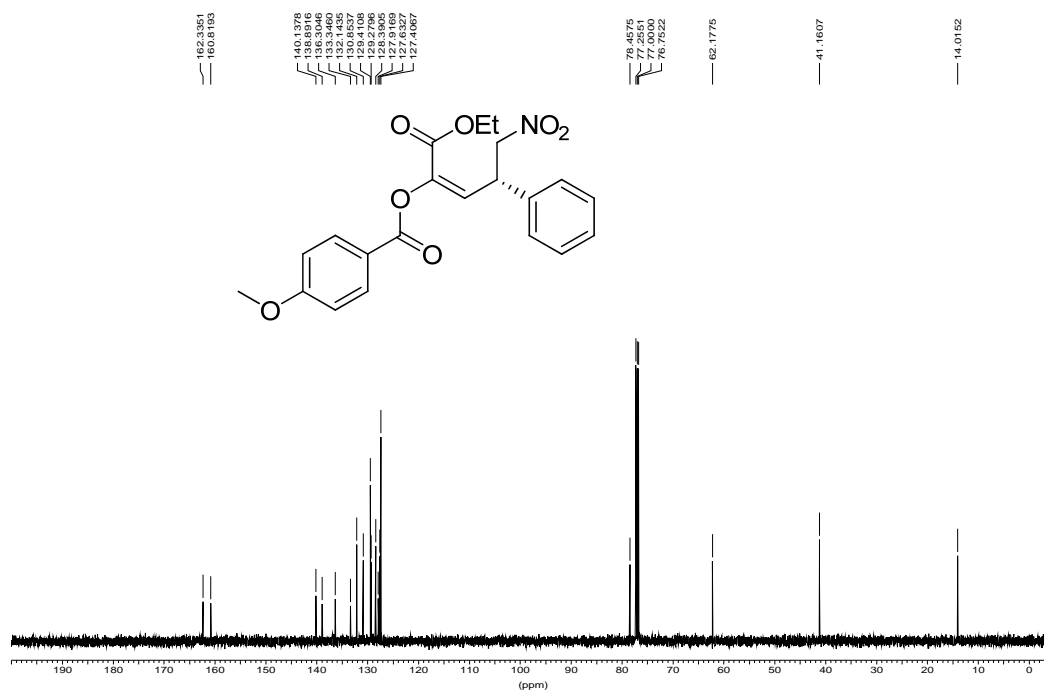
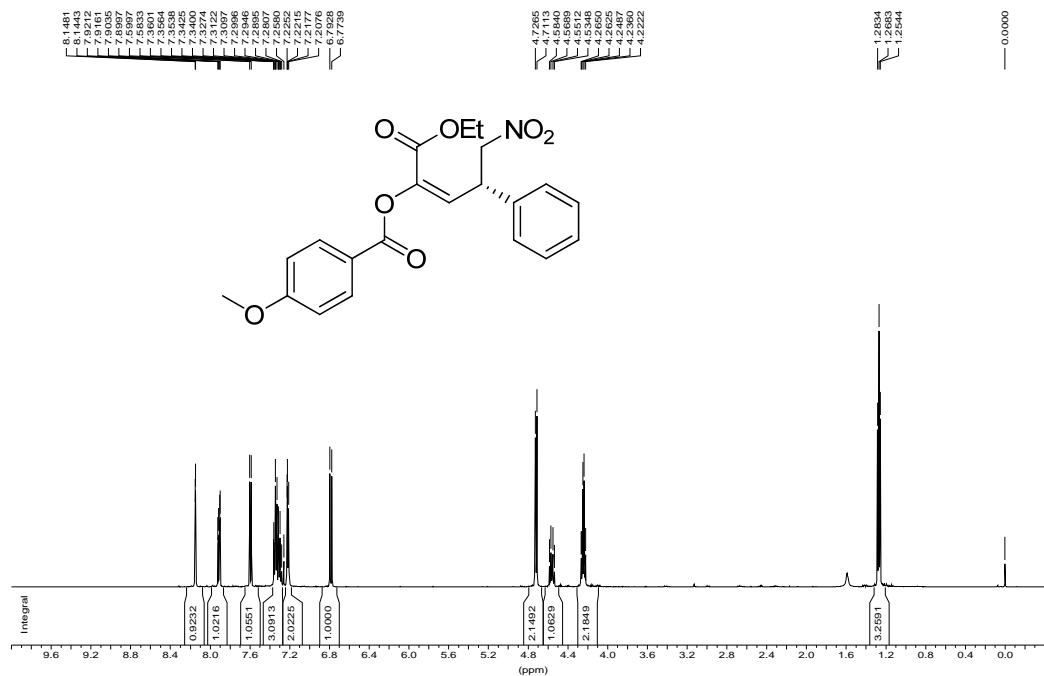
Compound **3o**



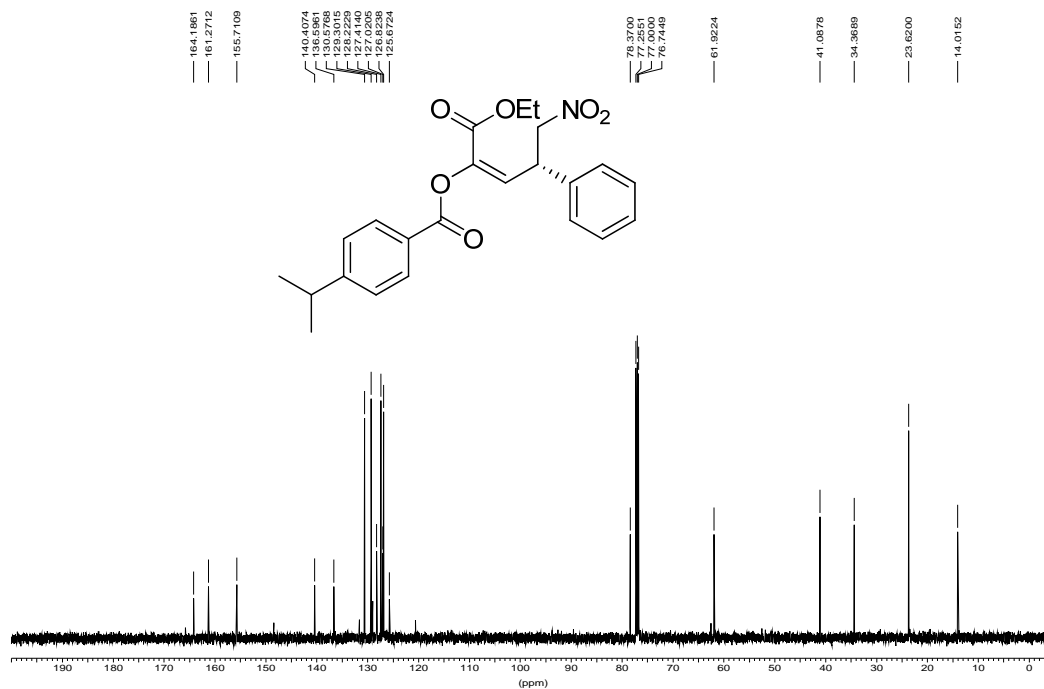
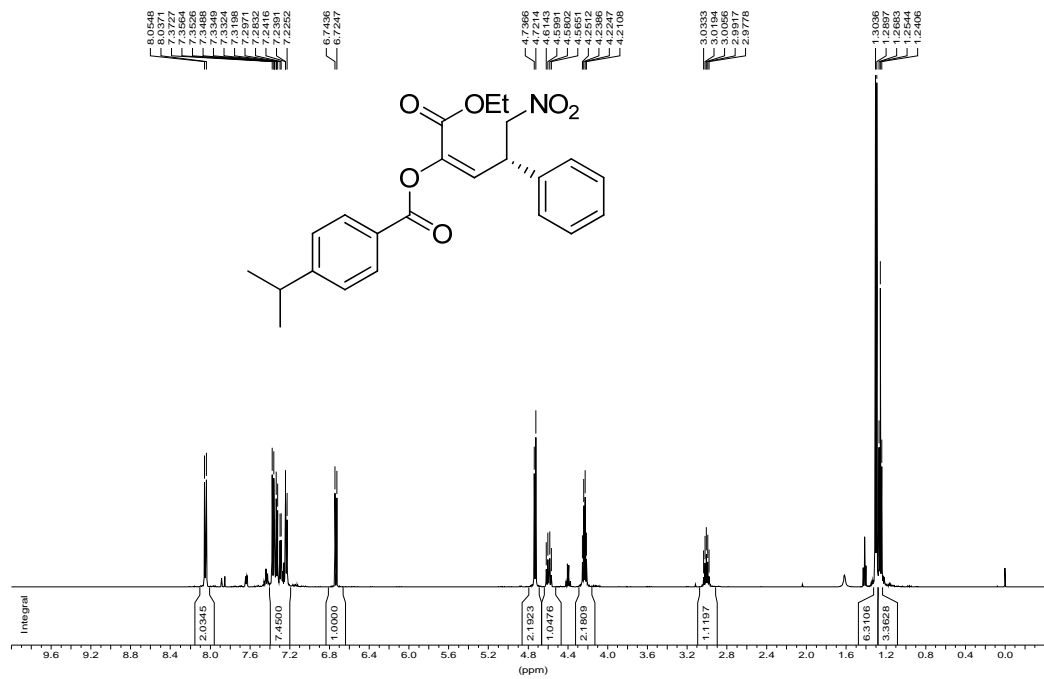
Compound **3p**



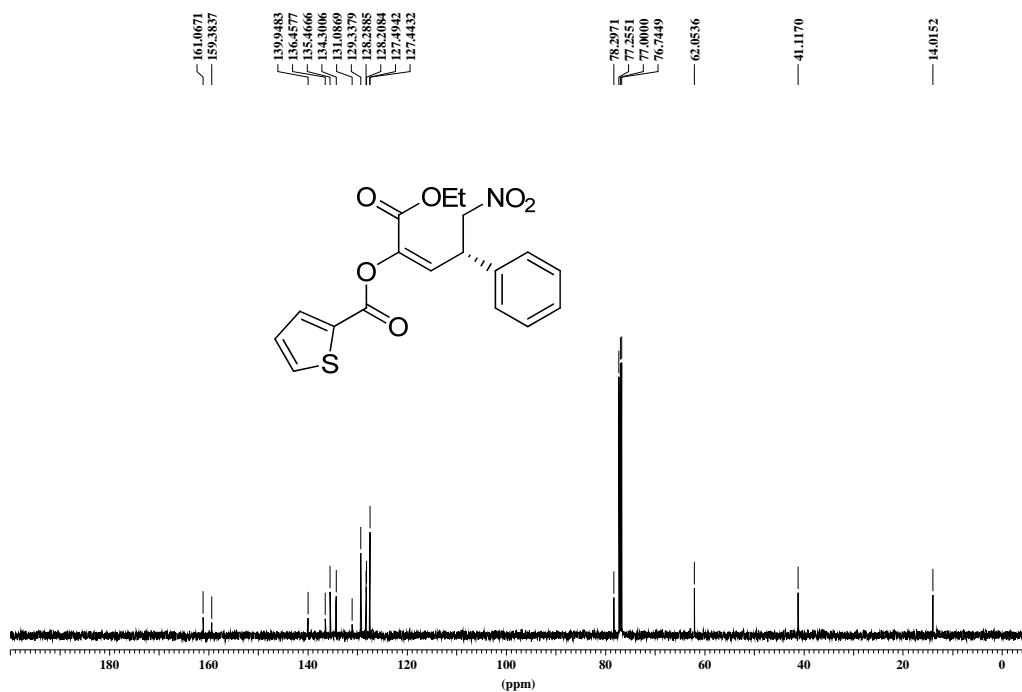
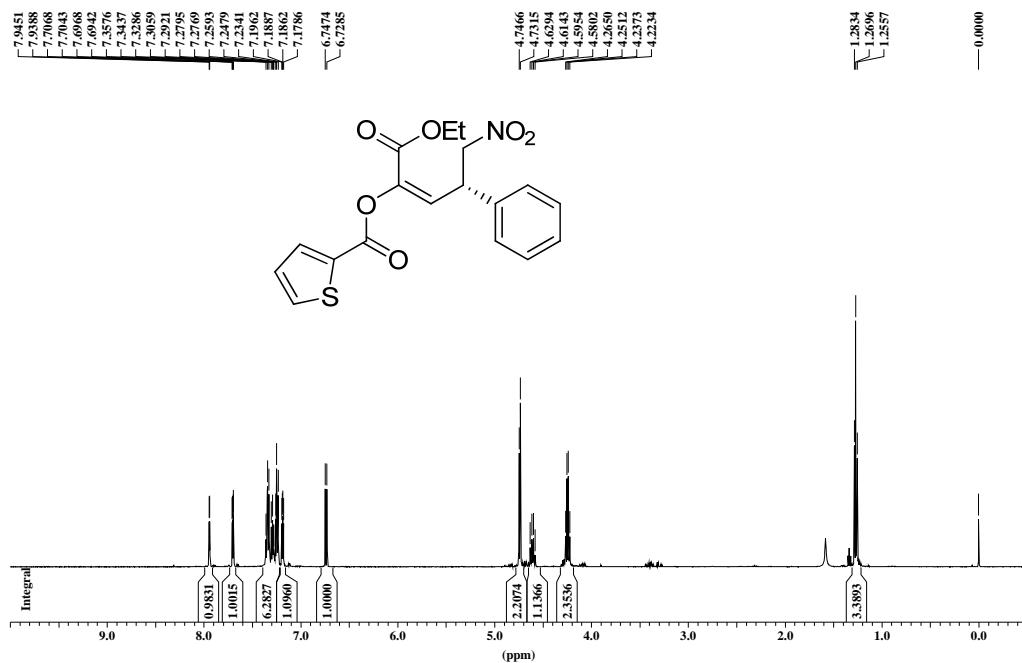
Compound **3q**



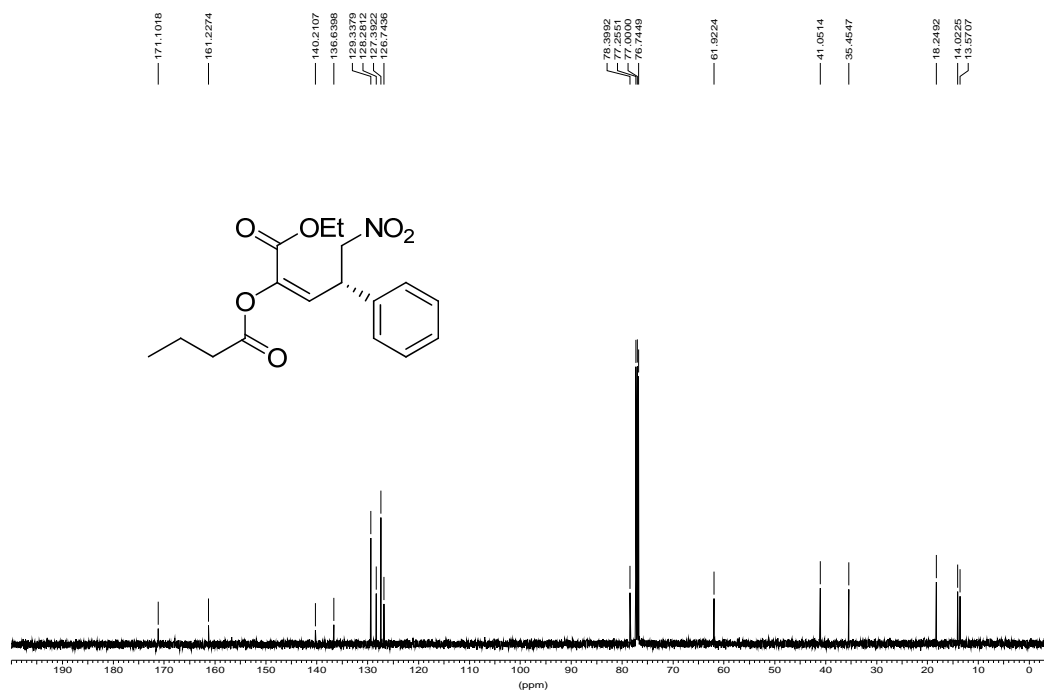
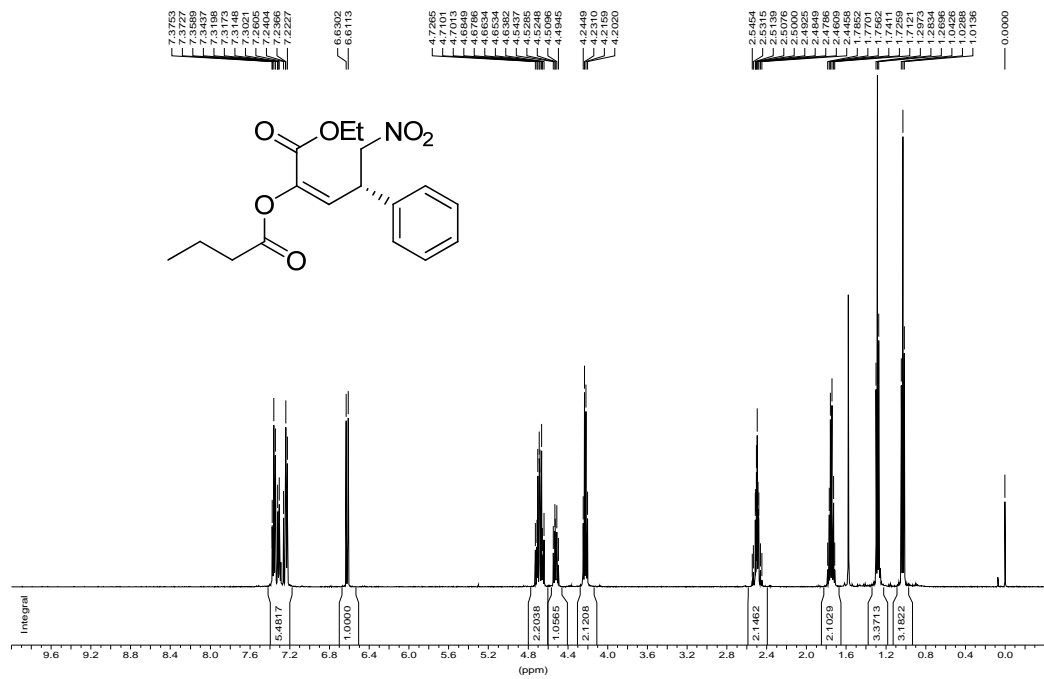
Compound **3r**



### Compound 3s

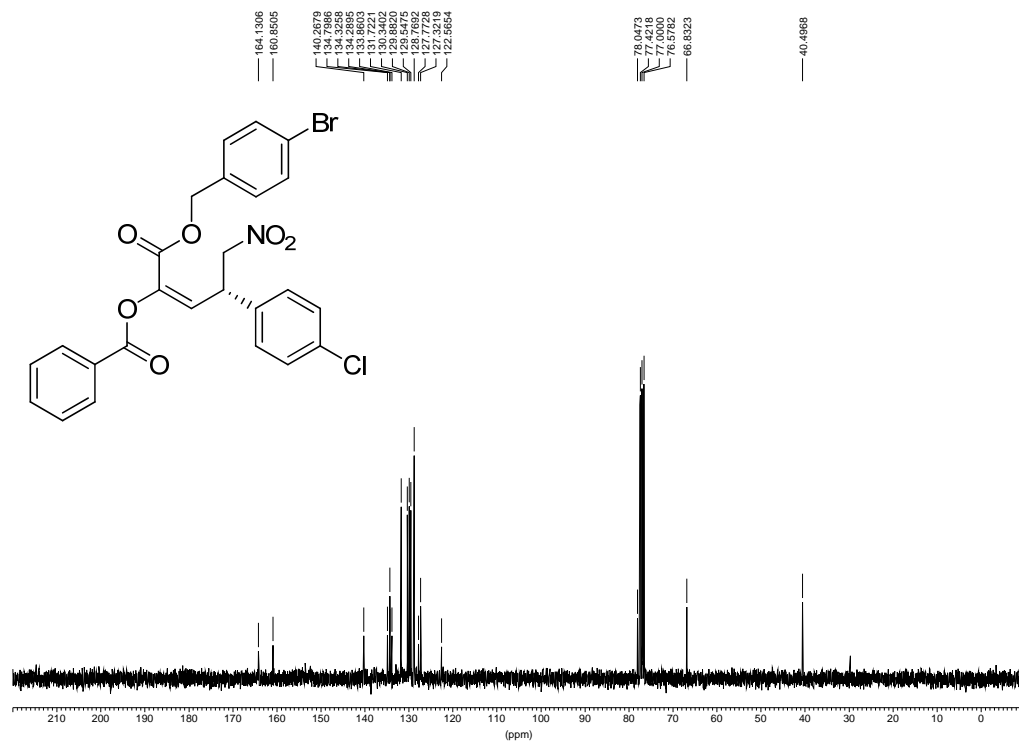
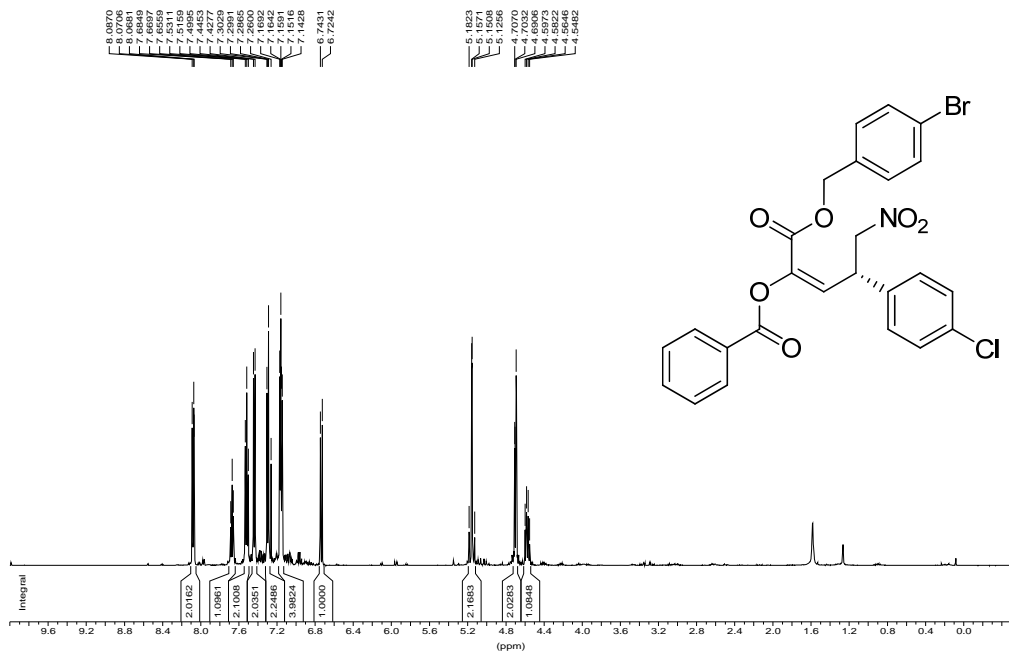


Compound **3t**





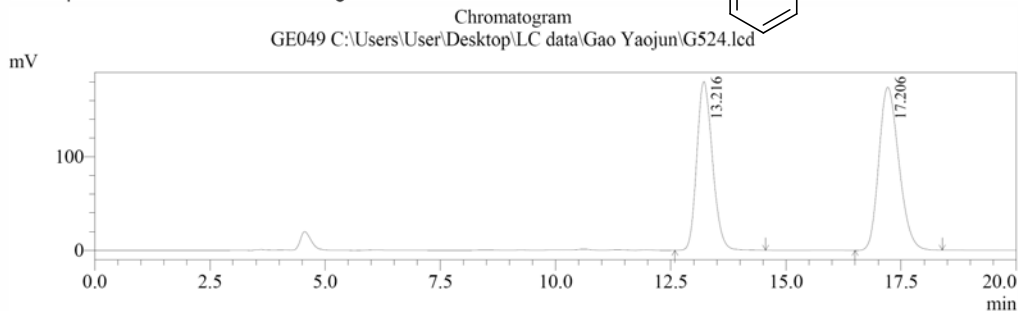
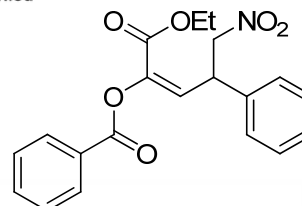
Compound **3u**



Compound 3a

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE049  
Sample ID : GYJ  
Data File Name : G524.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



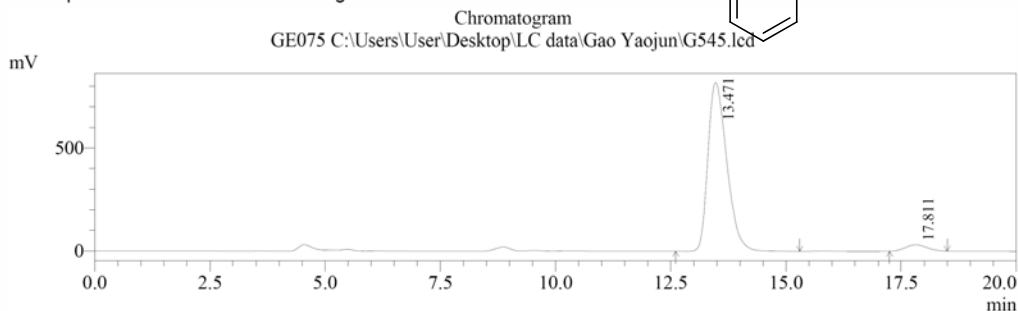
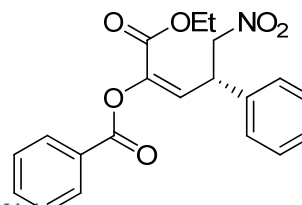
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.216	4268077	180252	44.718	50.830
2	17.206	5276367	174367	55.282	49.170
Total		9544443	354619	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE075  
Sample ID : GYJ  
Data File Name : G545.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

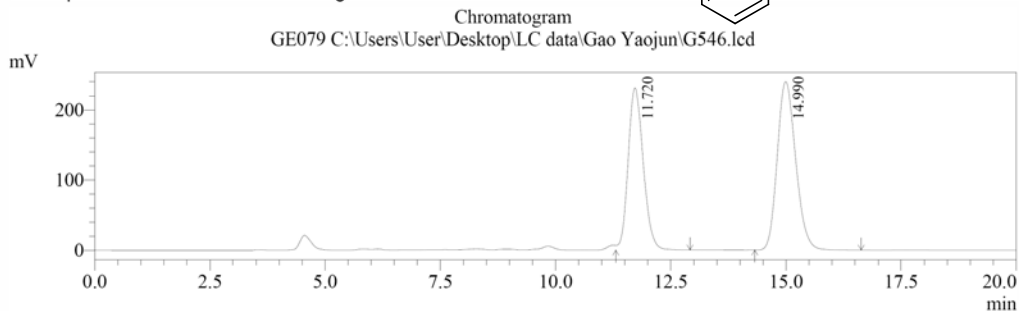
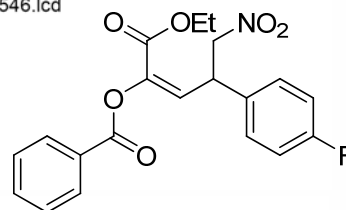
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.471	23325204	818742	95.911	96.340
2	17.811	994469	31105	4.089	3.660
Total		24319673	849847	100.000	100.000

Compound 3b

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G546.lcd  
 Acquired by : Admin  
 Sample Name : GE079  
 Sample ID : GYJ  
 Data File Name : G546.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



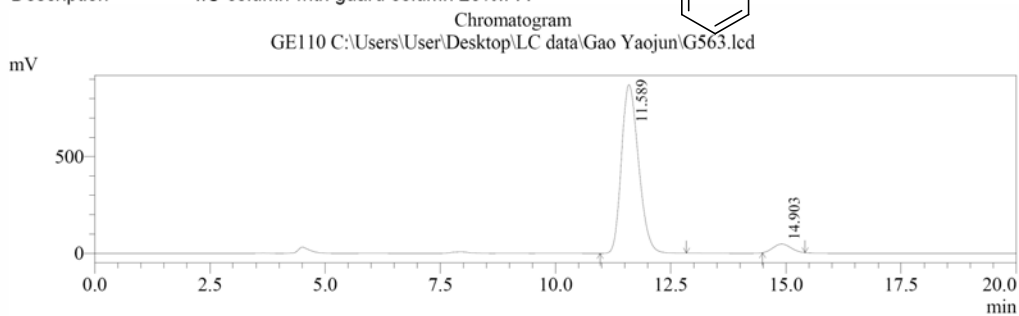
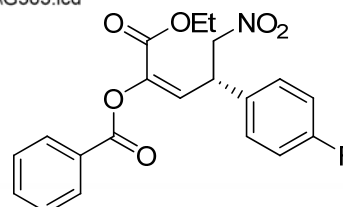
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.720	5286614	230995	44.185	49.052
2	14.990	6678117	239926	55.815	50.948
Total		11964731	470921	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G563.lcd  
 Acquired by : Admin  
 Sample Name : GE110  
 Sample ID : GYJ  
 Data File Name : G563.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

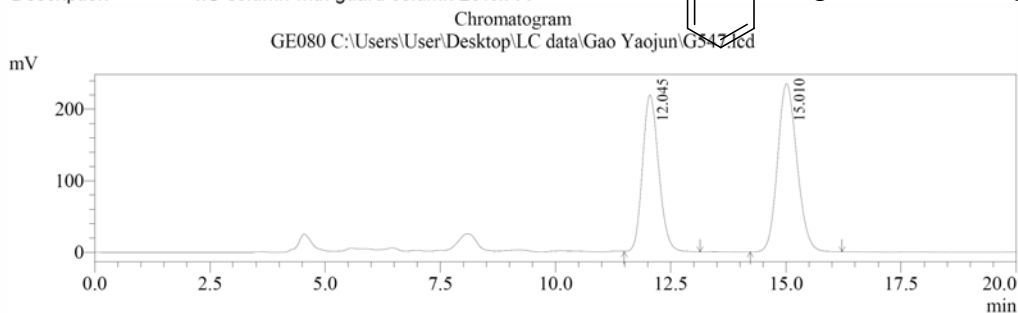
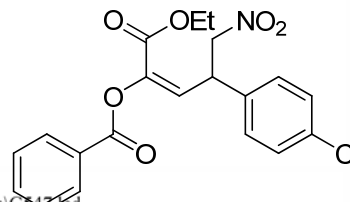
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.589	22517790	871552	94.992	95.114
2	14.903	1187202	44771	5.008	4.886
Total		23704992	916323	100.000	100.000

Compound 3c

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G547.lcd  
Acquired by : Admin  
Sample Name : GE080  
Sample ID : GYJ  
Data File Name : G547.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



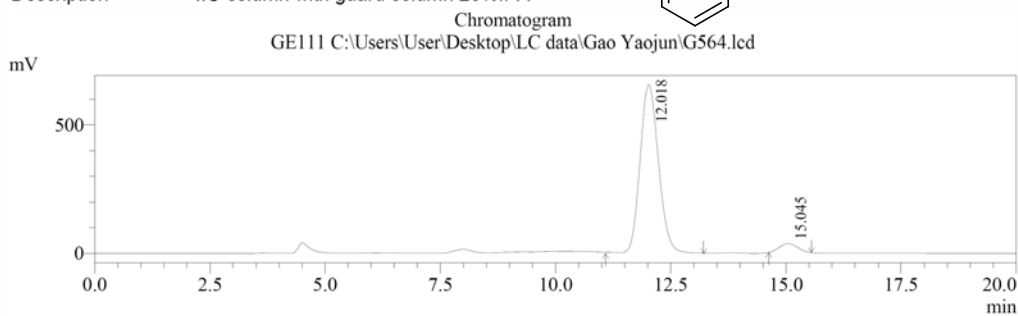
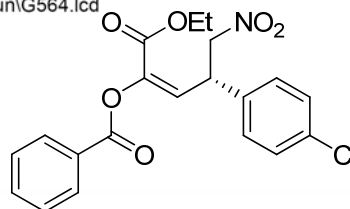
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.045	5366953	219299	43.823	48.244
2	15.010	6879846	235265	56.177	51.756
Total		12246799	454563	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G564.lcd  
Acquired by : Admin  
Sample Name : GE111  
Sample ID : GYJ  
Data File Name : G564.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

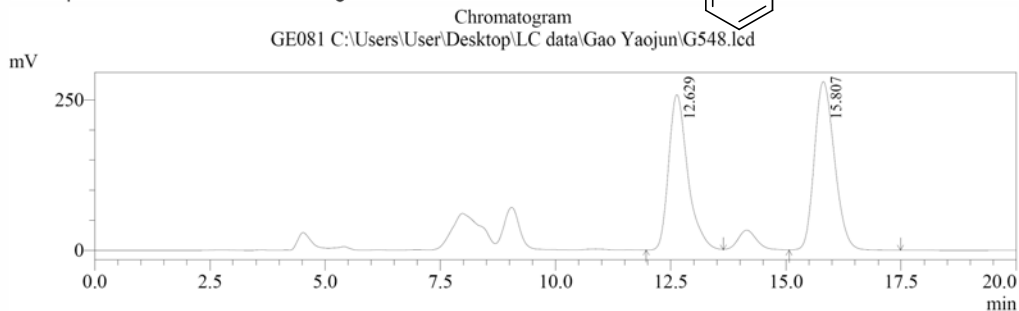
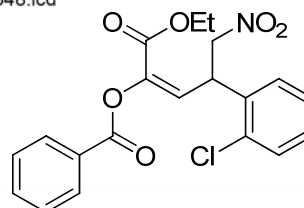
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.018	18491790	658078	95.080	94.960
2	15.045	956830	34927	4.920	5.040
Total		19448620	693005	100.000	100.000

Compound 3d

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE081  
Sample ID : GYJ  
Data File Name : G548.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



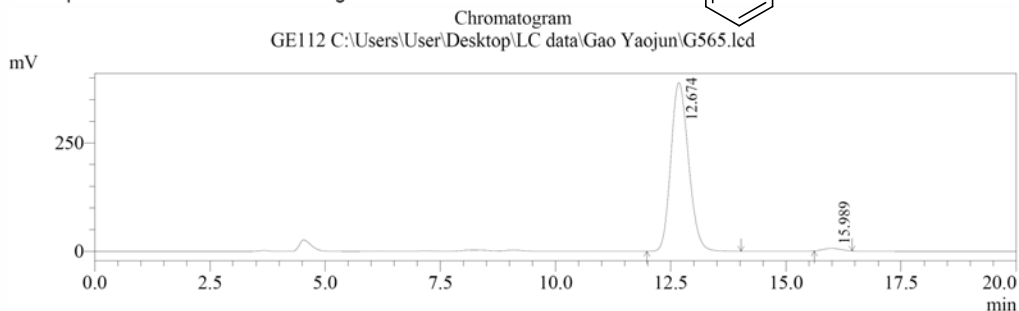
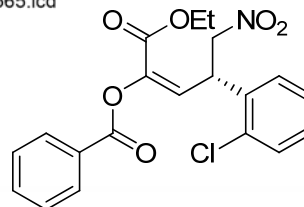
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.629	7485549	258343	46.707	47.973
2	15.807	8541082	280171	53.293	52.027
Total		16026630	538514	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE112  
Sample ID : GYJ  
Data File Name : G565.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

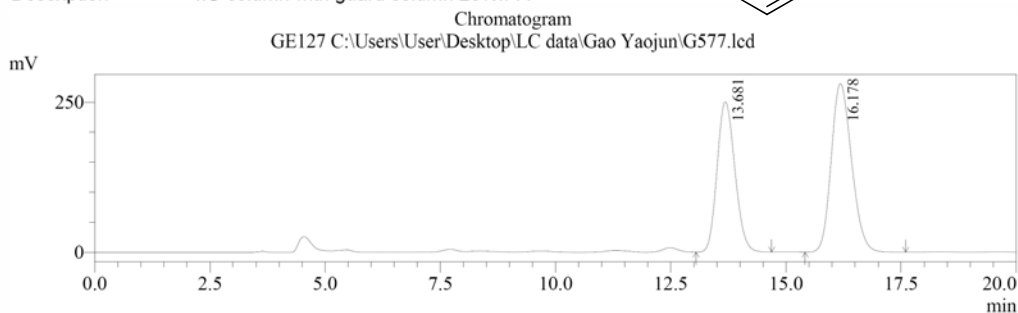
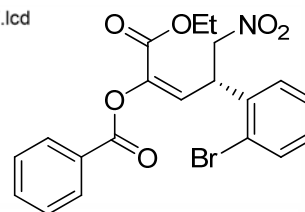
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.674	10361018	389086	98.513	98.456
2	15.989	156389	6104	1.487	1.544
Total		10517407	395190	100.000	100.000

Compound 3e

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G577.lcd  
Acquired by : Admin  
Sample Name : GE127  
Sample ID : GYJ  
Data File Name : G577.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



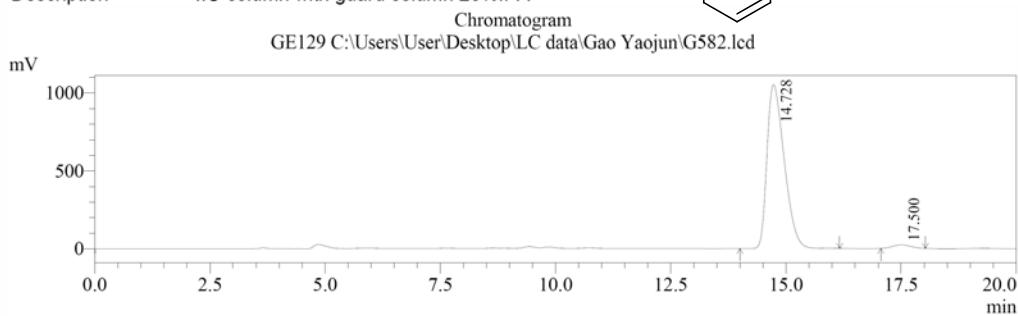
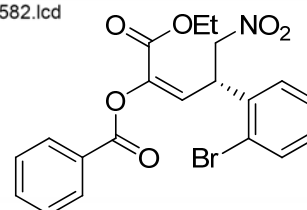
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.681	6722981	250142	43.832	47.152
2	16.178	8614980	280362	56.168	52.848
Total		15337961	530505	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G582.lcd  
Acquired by : Admin  
Sample Name : GE129  
Sample ID : RQ  
Data File Name : G582.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

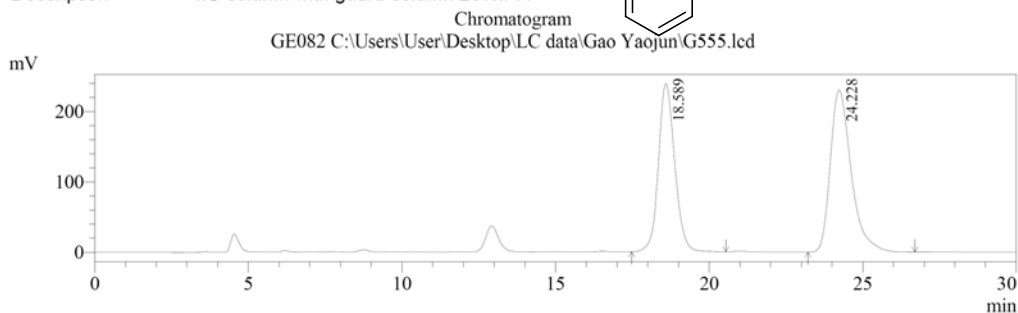
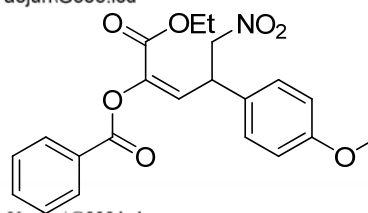
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	14.728	27294759	1052924	97.814	97.876
2	17.500	610127	22848	2.186	2.124
Total		27904886	1075772	100.000	100.000

Compound 3f

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G555.lcd  
 Acquired by : Admin  
 Sample Name : GE082  
 Sample ID : GYJ  
 Data File Name : G555.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



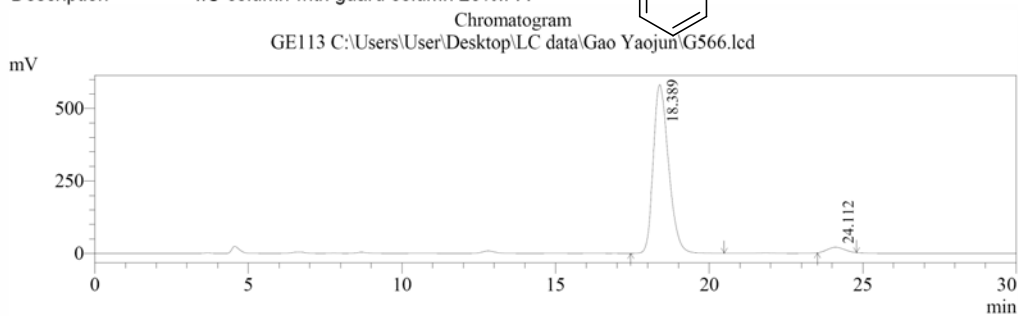
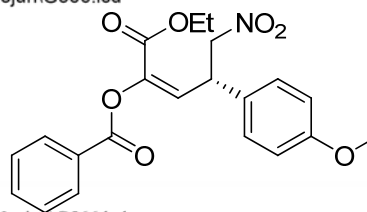
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.589	8818254	238947	44.794	50.932
2	24.228	10868066	230199	55.206	49.068
Total		19686320	469146	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G566.lcd  
 Acquired by : Admin  
 Sample Name : GE113  
 Sample ID : GYJ  
 Data File Name : G566.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

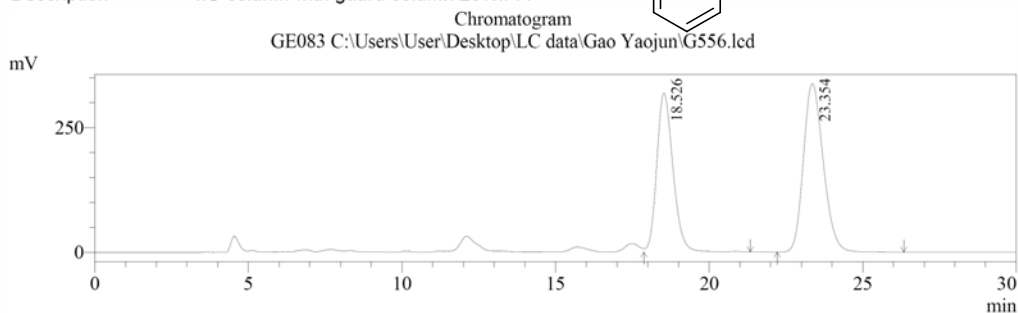
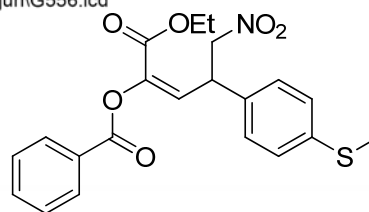
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.389	20172737	582016	96.549	96.876
2	24.112	721068	18768	3.451	3.124
Total		20893805	600784	100.000	100.000

Compound **3g**

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G556.lcd  
 Acquired by : Admin  
 Sample Name : GE083  
 Sample ID : GYJ  
 Data File Name : G556.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



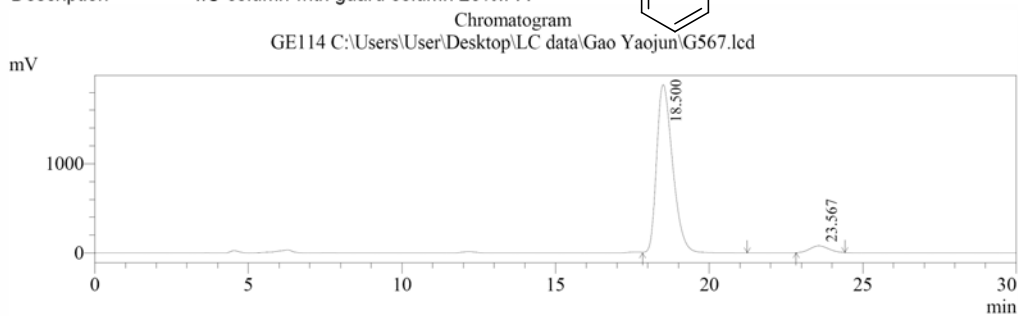
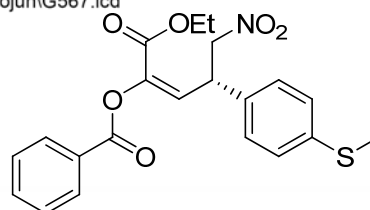
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.526	11665509	318648	43.366	48.518
2	23.354	15234917	338115	56.634	51.482
Total		26900426	656762	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G567.lcd  
 Acquired by : Admin  
 Sample Name : GE114  
 Sample ID : GYJ  
 Data File Name : G567.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

SPD-20A Ch1 254nm

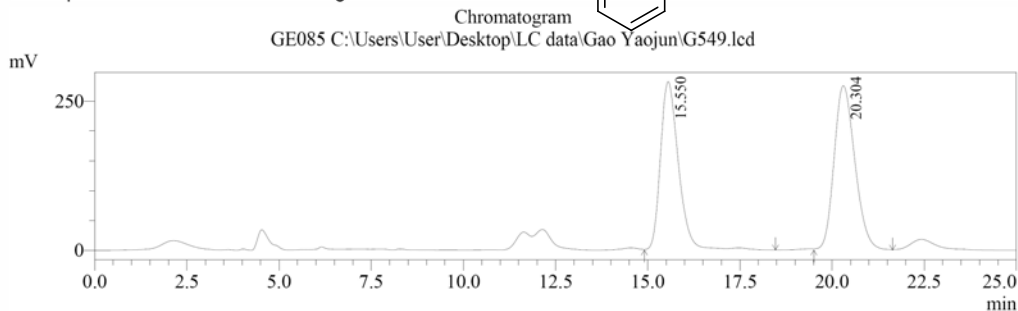
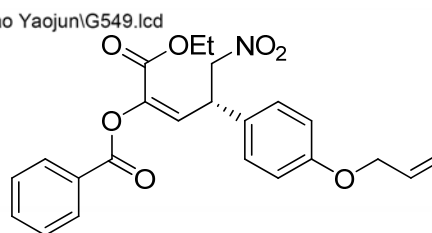
Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.500	68239449	1886380	95.533	96.127
2	23.567	3190712	75999	4.467	3.873
Total		71430161	1962379	100.000	100.000



Compound 3h

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE085  
Sample ID : GYJ  
Data File Name : G549.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



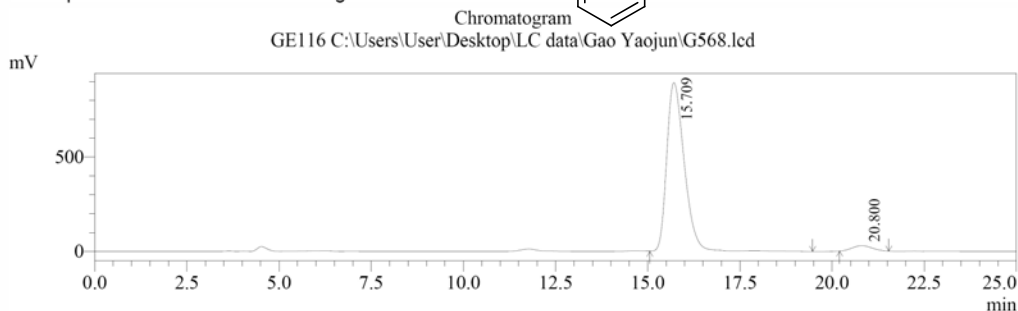
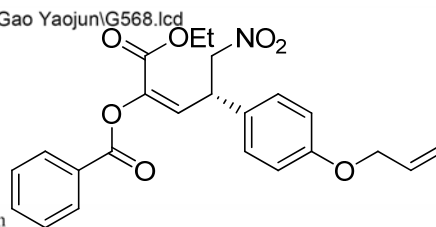
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.550	9622614	282276	47.007	50.595
2	20.304	10847795	275637	52.993	49.405
Total		20470409	557913	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE116  
Sample ID : GYJ  
Data File Name : G568.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

SPD-20A Ch1 254nm

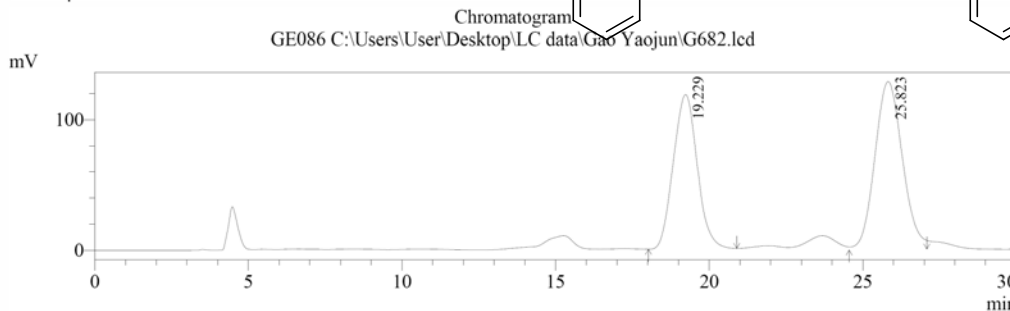
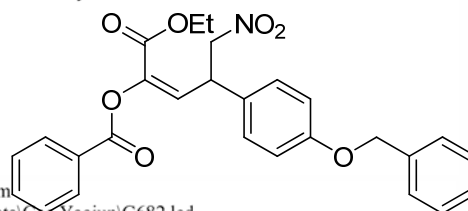
Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.709	29561063	893515	96.512	96.894
2	20.800	1068360	28644	3.488	3.106
Total		30629423	922159	100.000	100.000

Compound 3i

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE086  
 Sample ID : GYJ  
 Data File Name : G682.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column 20%IPA

C:\Users\User\Desktop\LC data\Gao Yaojun\G682.lcd



PeakTable

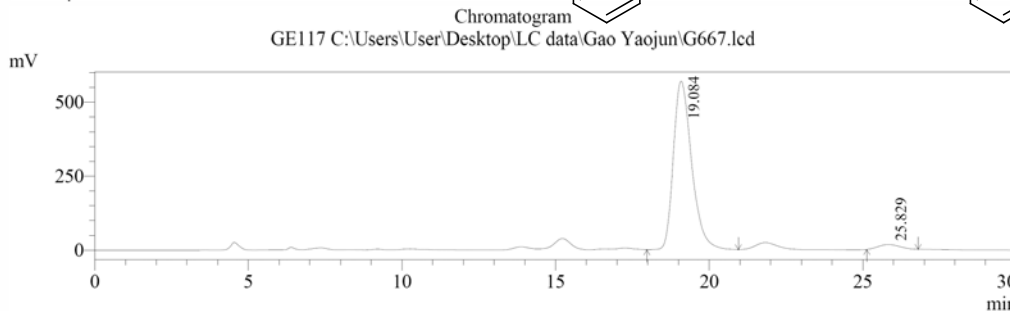
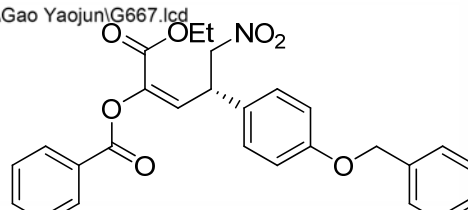
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	19.229	6399843	118228	44.329	47.890
2	25.823	8037321	128648	55.671	52.110
Total		14437165	246876	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE117  
 Sample ID : GYJ  
 Data File Name : G667.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column 20%IPA

C:\Users\User\Desktop\LC data\Gao Yaojun\G667.lcd



PeakTable

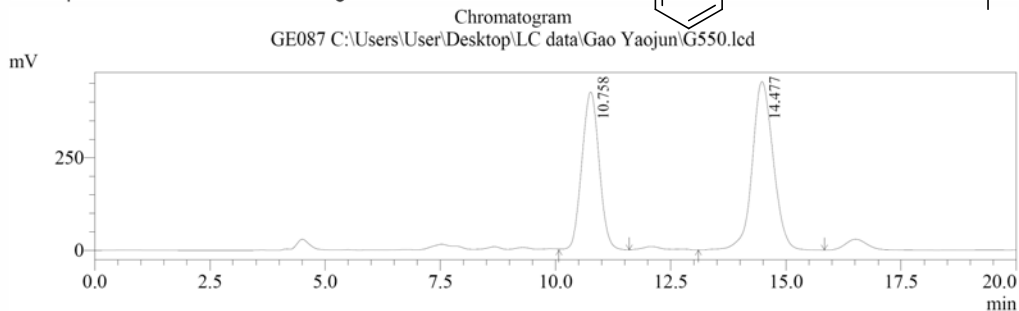
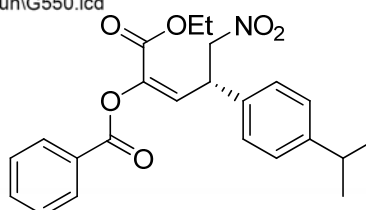
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	19.084	23639892	569585	96.699	97.189
2	25.829	806962	16476	3.301	2.811
Total		24446854	586061	100.000	100.000

Compound 3j

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE087  
 Sample ID : GYJ  
 Data File Name : G550.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



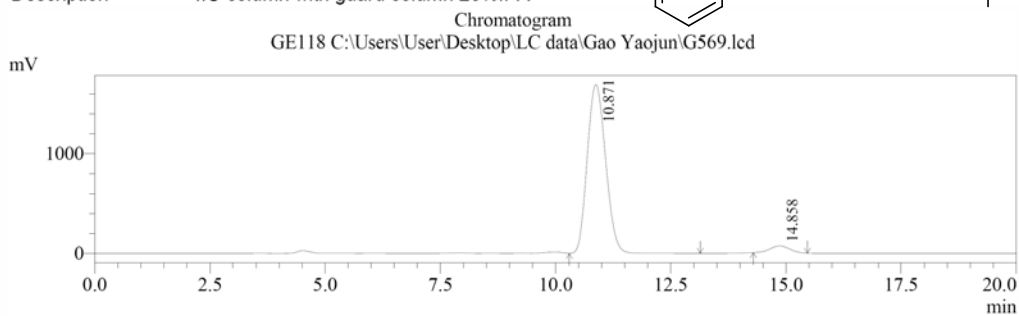
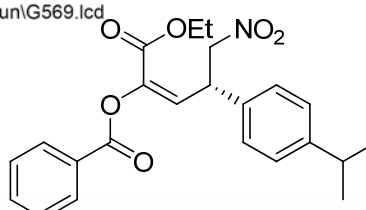
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	10.758	11194807	426522	43.574	48.395
2	14.477	14496568	454815	56.426	51.605
Total		25691375	881338	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE118  
 Sample ID : GYJ  
 Data File Name : G569.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

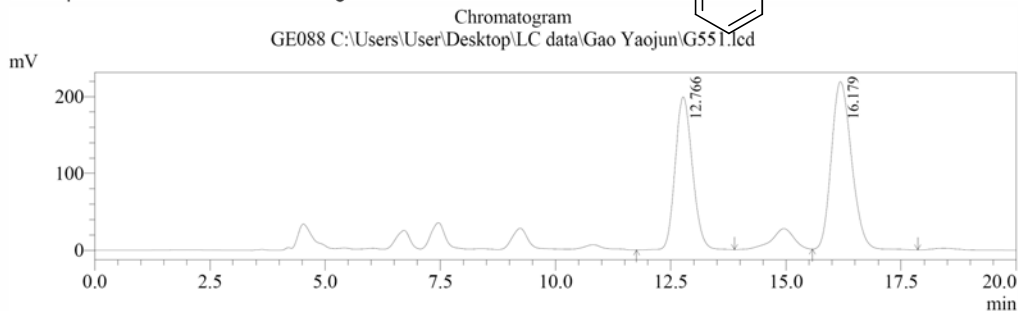
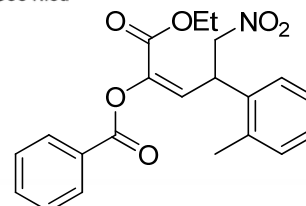
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	10.871	46877732	1692791	95.802	96.064
2	14.858	2054272	69366	4.198	3.936
Total		48932005	1762157	100.000	100.000

Compound 3k

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE088  
 Sample ID : GYJ  
 Data File Name : G551.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



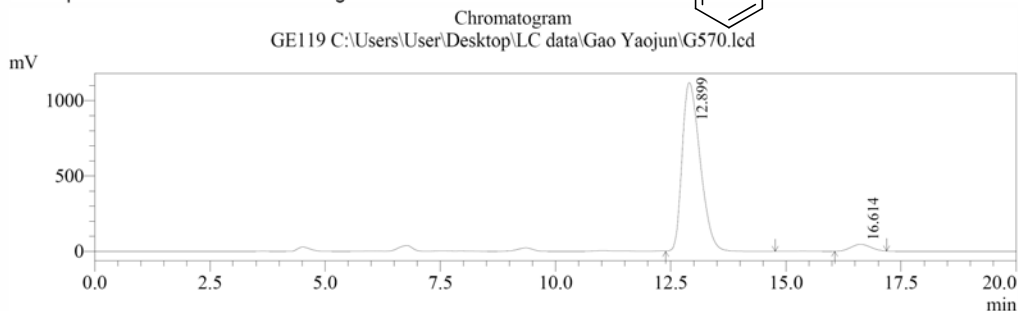
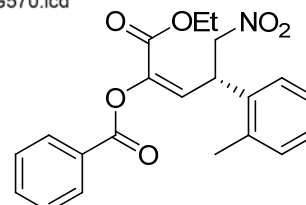
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.766	5183219	198974	43.796	47.692
2	16.179	6651594	218233	56.204	52.308
Total		11834813	417207	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE119  
 Sample ID : GYJ  
 Data File Name : G570.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

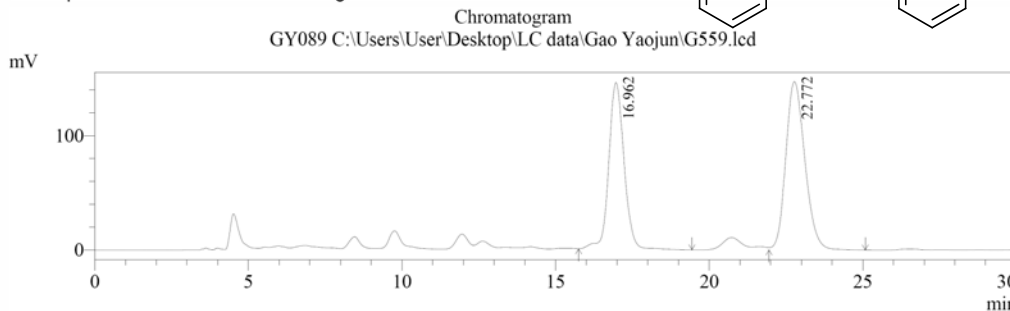
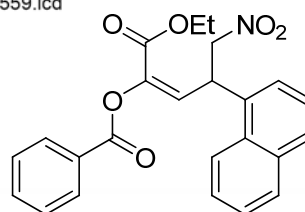
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.899	30455168	1118483	95.776	96.092
2	16.614	1343054	45488	4.224	3.908
Total		31798222	1163970	100.000	100.000

Compound 3I

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GY089  
 Sample ID : GYJ  
 Data File Name : G559.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



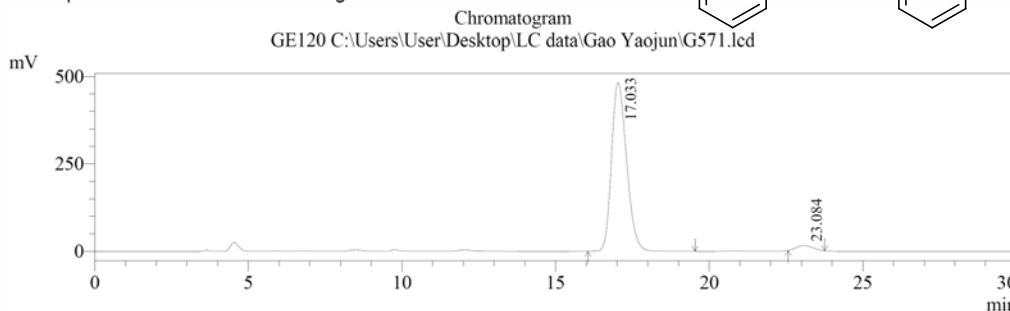
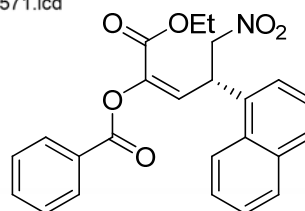
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	16.962	5027778	145599	44.159	49.749
2	22.772	6357797	147072	55.841	50.251
Total		11385575	292671	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE120  
 Sample ID : GYJ  
 Data File Name : G571.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

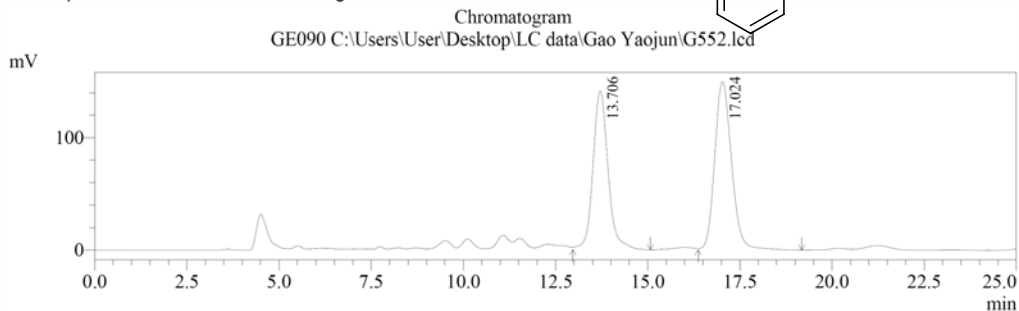
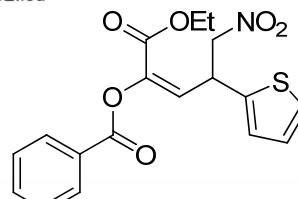
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	17.033	16476736	482281	96.847	97.092
2	23.084	536470	14444	3.153	2.908
Total		17013206	496726	100.000	100.000

Compound **3m**

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE090  
 Sample ID : GYJ  
 Data File Name : G552.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



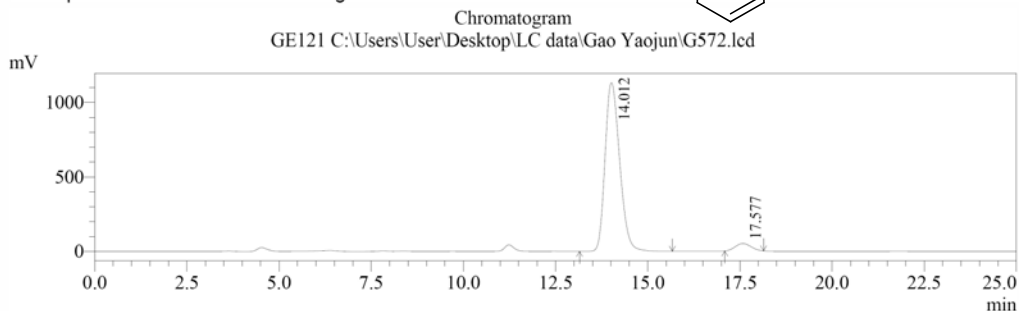
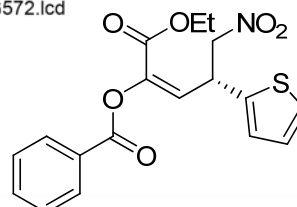
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.706	4002846	141125	45.801	48.559
2	17.024	4736879	149502	54.199	51.441
Total		8739725	290627	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE121  
 Sample ID : GYJ  
 Data File Name : G572.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



PeakTable

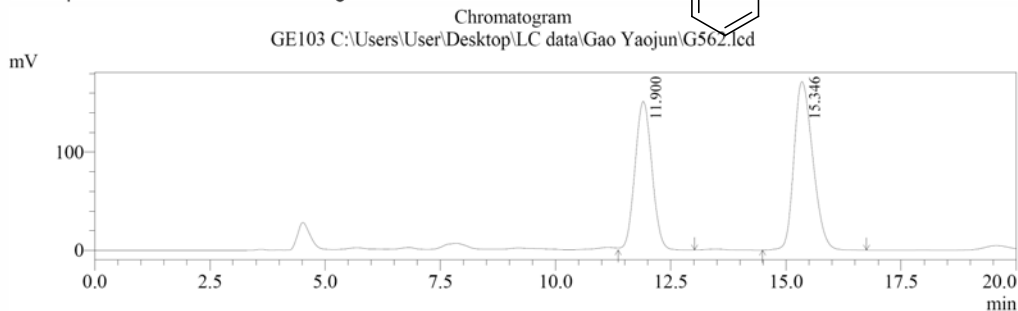
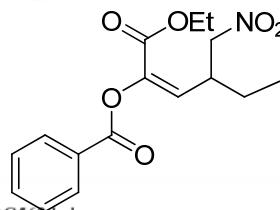
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	14.012	31167444	1133451	95.456	95.754
2	17.577	1483729	50261	4.544	4.246
Total		32651173	1183712	100.000	100.000

Compound 3n

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G562.lcd  
Acquired by : Admin  
Sample Name : GE103  
Sample ID : GYJ  
Data File Name : G562.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



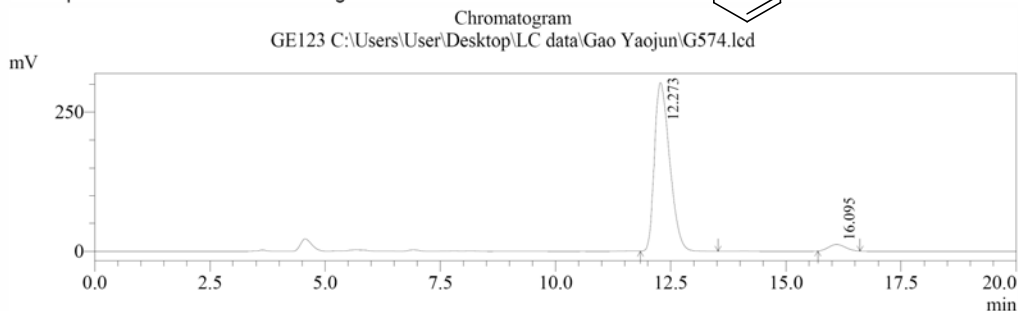
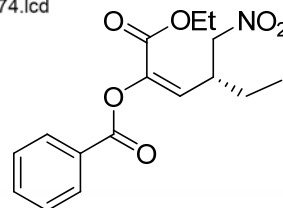
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	11.900	3866622	151138	44.092	46.835
2	15.346	4902823	171565	55.908	53.165
Total		8769445	322702	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

C:\Users\User\Desktop\LC data\Gao Yaojun\G574.lcd  
Acquired by : Admin  
Sample Name : GE123  
Sample ID : GYJ  
Data File Name : G574.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

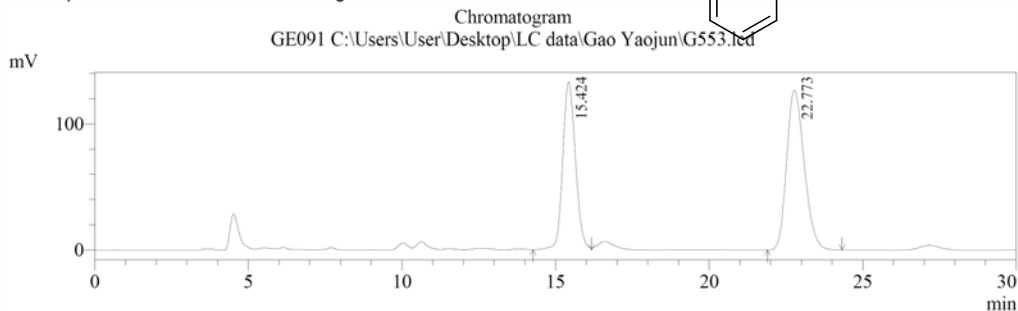
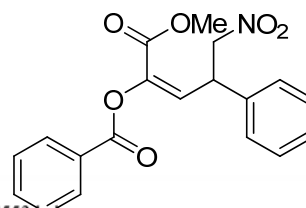
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.273	6978484	303131	95.879	96.236
2	16.095	299968	11855	4.121	3.764
Total		7278452	314986	100.000	100.000

Compound 3o

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE091  
Sample ID : GYJ  
Data File Name : G553.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



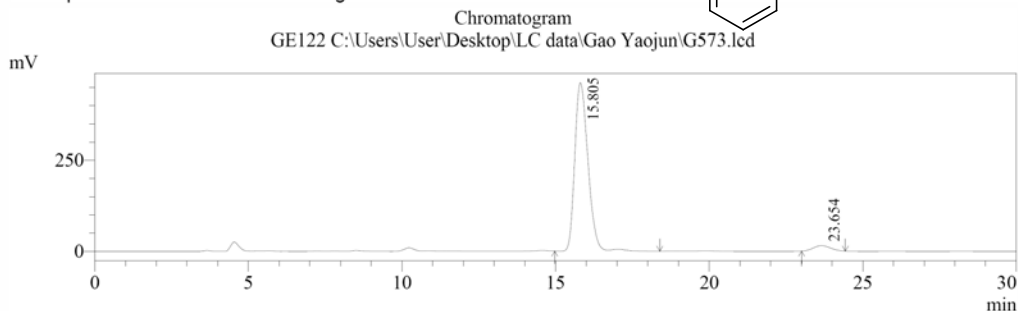
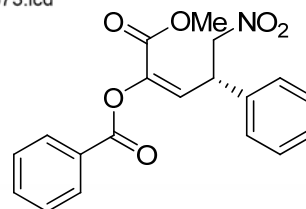
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.424	3827404	133351	43.182	51.304
2	22.773	5035981	126571	56.818	48.696
Total		8863385	259923	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE122  
Sample ID : GYJ  
Data File Name : G573.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column 20%IPA



PeakTable

SPD-20A Ch1 254nm

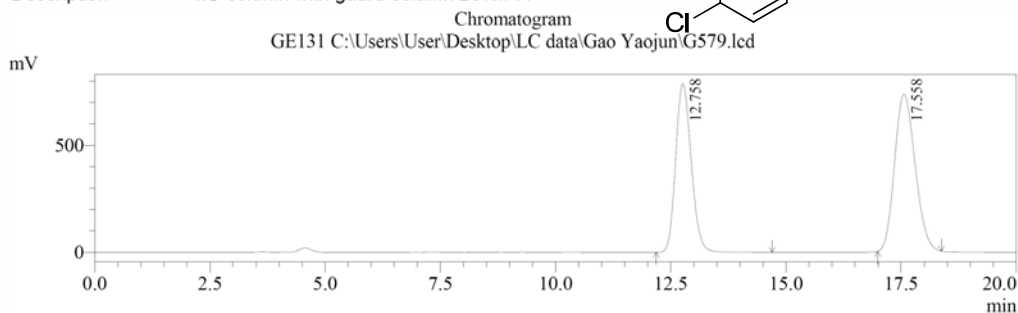
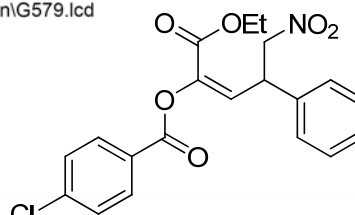
Peak#	Ret. Time	Area	Height	Area %	Height %
1	15.805	13810871	462639	95.968	96.853
2	23.654	580271	15033	4.032	3.147
Total		14391142	477672	100.000	100.000



Compound 3p

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE131  
 Sample ID : GYJ  
 Data File Name : G579.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column 20%IPA



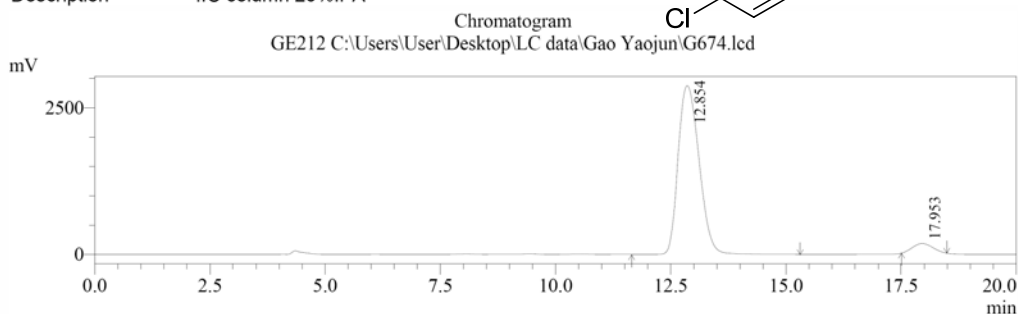
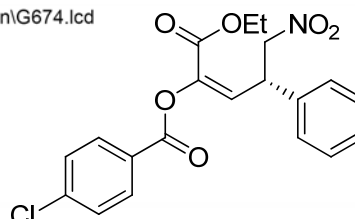
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.758	18535379	788010	44.981	51.813
2	17.558	22671701	732868	55.019	48.187
Total		41207080	1520878	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE212  
 Sample ID : GYJ  
 Data File Name : G674.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column 20%IPA



PeakTable

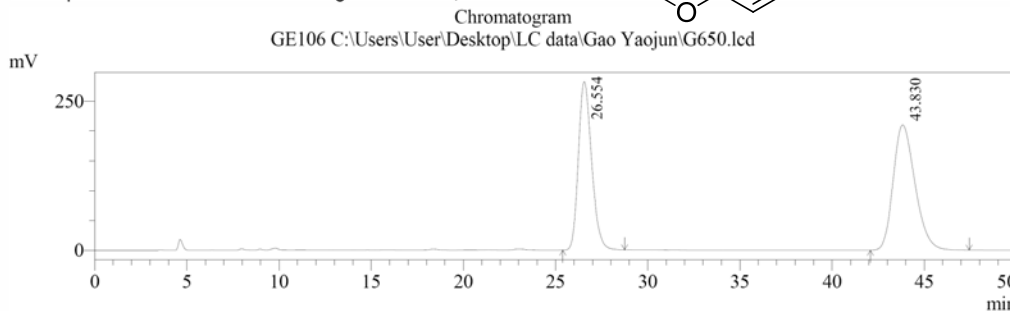
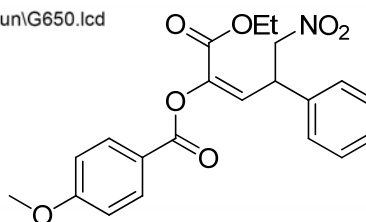
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.854	92472785	2888439	94.883	94.640
2	17.953	4986556	163586	5.117	5.360
Total		97459340	3052025	100.000	100.000

Compound 3q

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE106  
 Sample ID : GYJ  
 Data File Name : G650.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column,20%IPA



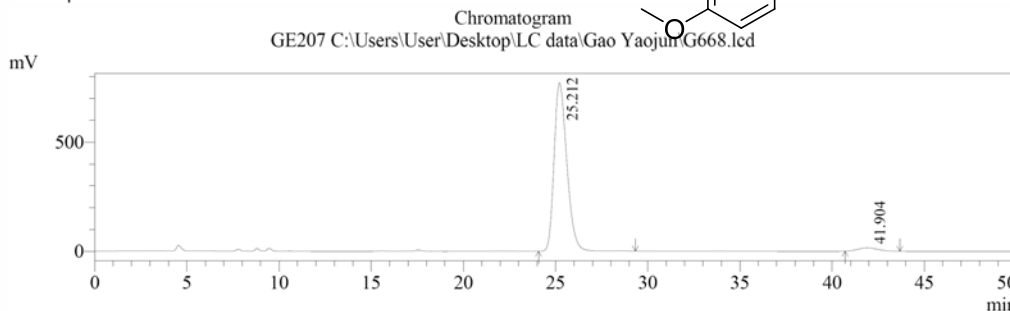
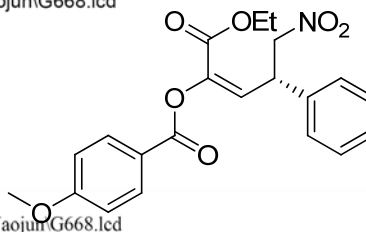
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	26.554	14107413	282231	44.946	57.360
2	43.830	17279894	209799	55.054	42.640
Total		31387307	492030	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
 Sample Name : GE207  
 Sample ID : GYJ  
 Data File Name : G668.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column 20%IPA



PeakTable

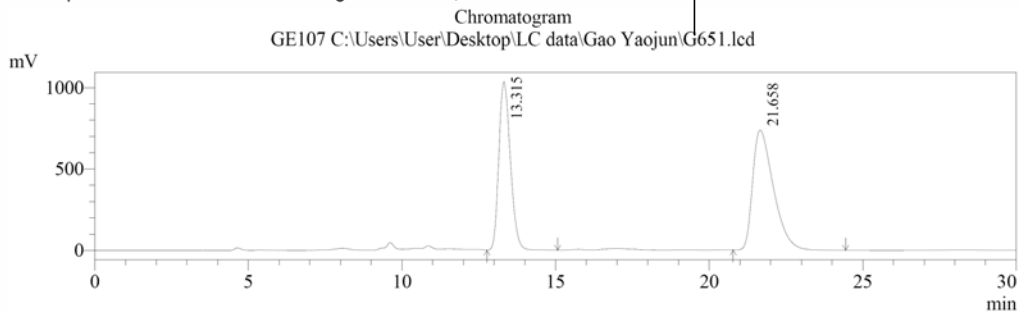
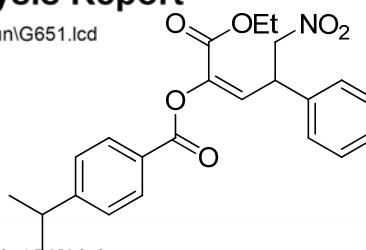
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	25.212	37144501	773033	96.971	98.050
2	41.904	1160214	15377	3.029	1.950
Total		38304715	788410	100.000	100.000

Compound 3r

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE107  
Sample ID : GYJ  
Data File Name : G651.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column with guard column,20%IPA



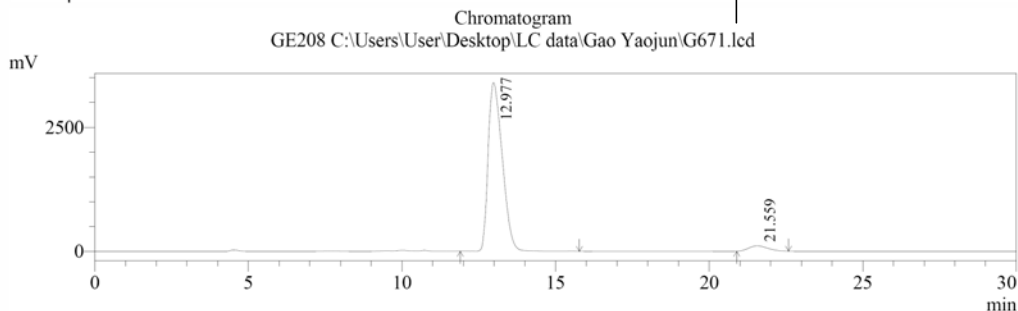
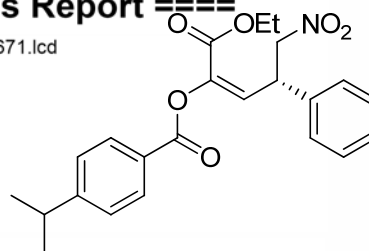
PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	13.315	27140715	1035910	43.988	58.450
2	21.658	34558945	736402	56.012	41.550
Total		61699660	1772312	100.000	100.000

==== Shimadzu LCsolution Analysis Report ====

Acquired by : Admin  
Sample Name : GE208  
Sample ID : GYJ  
Data File Name : G671.lcd  
Method File Name : 20%IPA, 1ml-min, 40min.lcm  
Batch File Name :  
Report File Name : Default.lcr  
Description : IC column 20%IPA



PeakTable

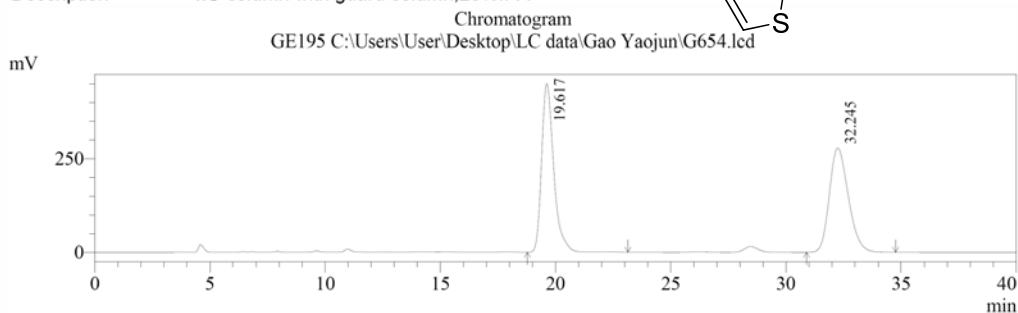
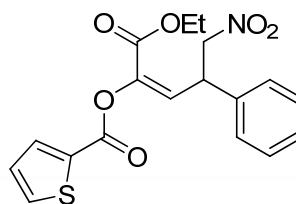
SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	12.977	109541323	3401281	95.893	96.909
2	21.559	4691437	108488	4.107	3.091
Total		114232760	3509769	100.000	100.000

Compound 3s

==== Shimadzu LCsolution Analysis Report ====

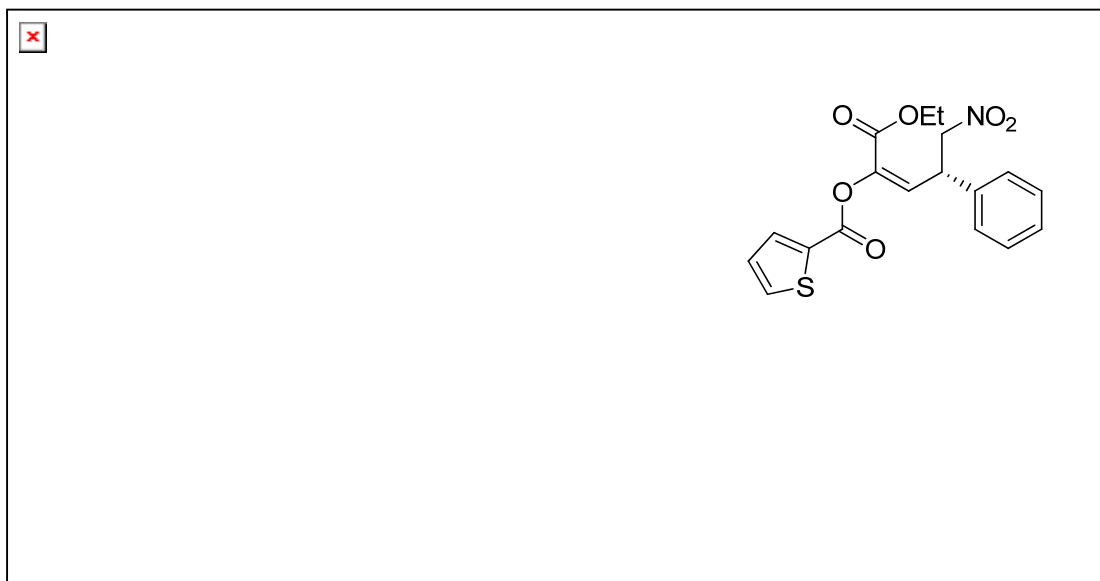
Acquired by : Admin  
 Sample Name : GE195  
 Sample ID : GYJ  
 Data File Name : G654.lcd  
 Method File Name : 20%IPA, 1ml-min, 40min.lcm  
 Batch File Name :  
 Report File Name : Default.lcr  
 Description : IC column with guard column,20%IPA



PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	19.617	16524115	451063	50.892	61.796
2	32.245	15944598	278863	49.108	38.204
Total		32468713	729926	100.000	100.000

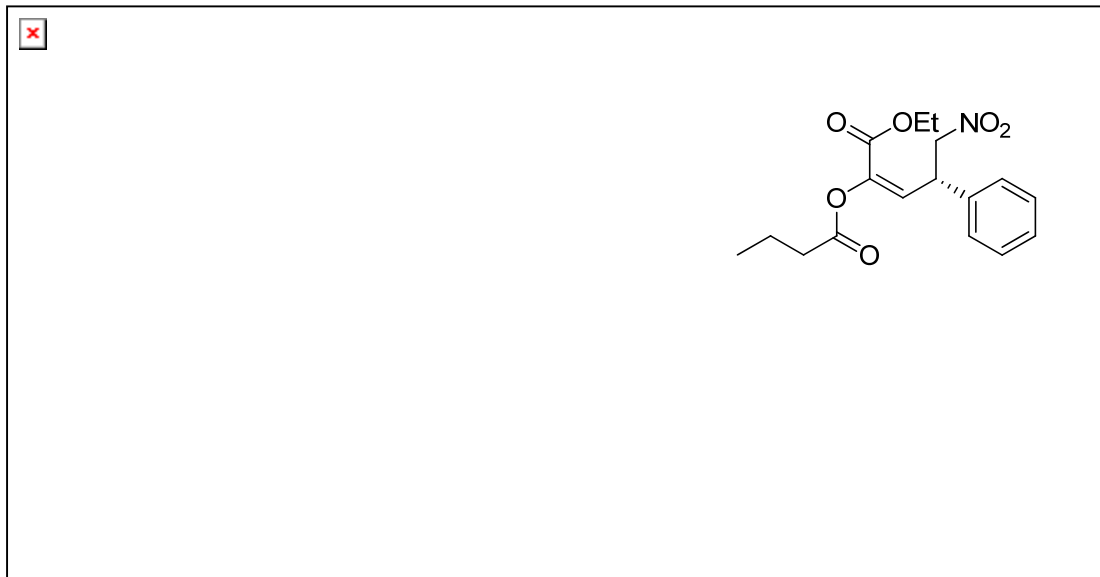


PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.820	178087572	2643120	94.990	95.781
2	31.032	9393292	116418	5.010	4.219
Total		187480864	2759538	100.000	100.000

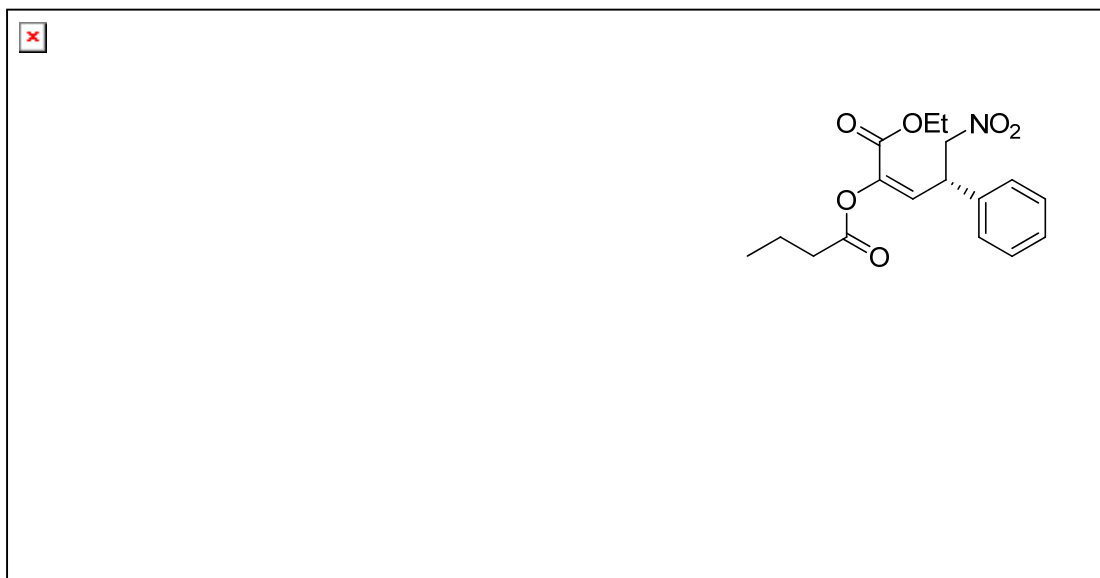
Compound 3t



PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	18.820	8987651	133373	46.380	45.504
2	21.817	10390822	159727	53.620	54.496
Total		19378472	293100	100.000	100.000



PeakTable

SPD-20A Ch1 254nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	17.977	27799374	667391	87.582	85.223
2	21.527	3941450	115721	12.418	14.777
Total		31740824	783112	100.000	100.000