

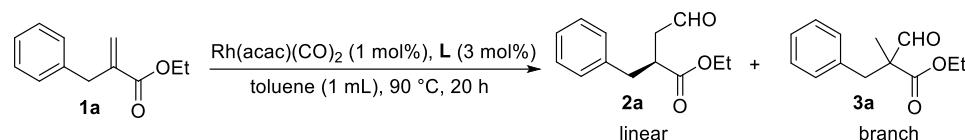
# **Rhodium-Catalyzed Enantioselective Anti-Markovnikov Hydroformylation of $\alpha$ -Substituted Acryl Acid Derivatives**

Shuailong Li, Zhuangxing, Li, Cai You, Xiuxiu Li, Jiabin Yang, Hui Lv, Xumu Zhang

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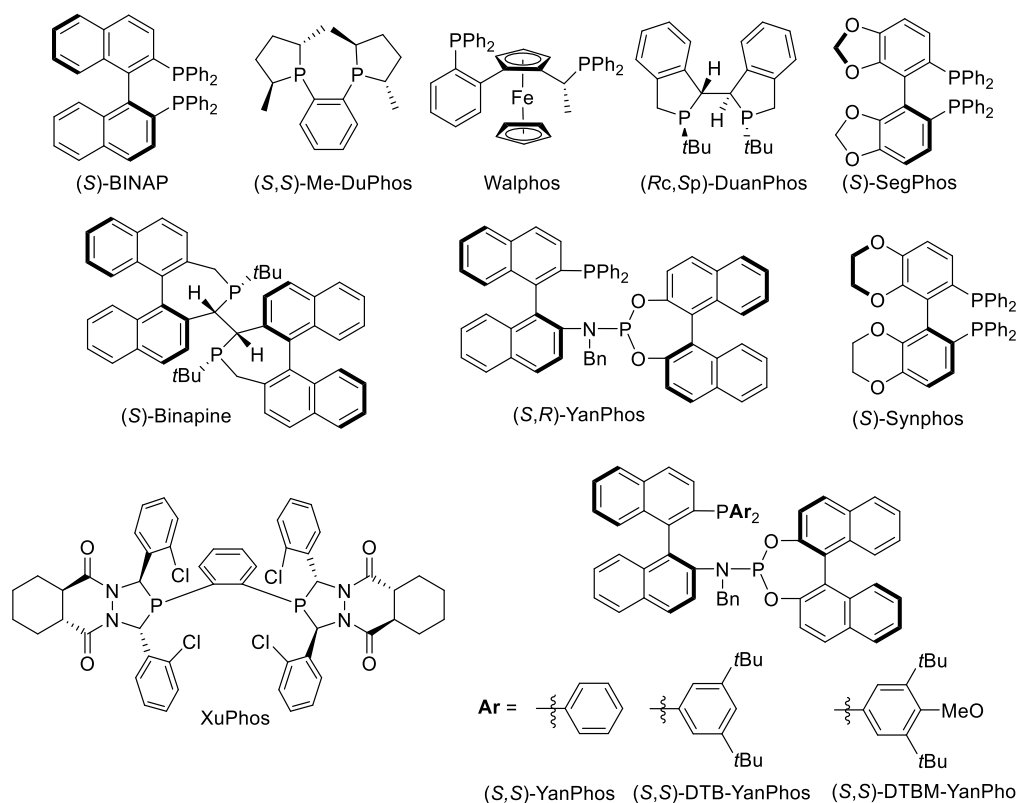
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**1. General Information.** All reactions and manipulations that were sensitive to moisture or air were performed in a ragon-filled glovebox or using standard Schlenk techniques, unless otherwise noted. Solvents were dried with standard procedures, degassed with N<sub>2</sub> and transferred by syringe. NMR spectra were recorded on Bruker ADVANCE III (400 MHz) spectrometers for <sup>1</sup>H NMR and <sup>13</sup>C NMR. CDCl<sub>3</sub> was the solvent used for the NMR analysis, with tetramethylsilane as the internal standard. Chemical shifts were reported upfield to TMS (0.00 ppm) for <sup>1</sup>H NMR and relative to CDCl<sub>3</sub> (77.0 ppm) for <sup>13</sup>C NMR. Optical rotation was determined using a Perkin Elmer 343 polarimeter. HPLC analysis was conducted on an Agilent 1260 Series instrument. Thin layer chromatography (TLC) was performed on EM reagents 0.25 mm silica 60-F plates. All new products were further characterized by HRMS. A positive ion mass spectrum of sample was acquired on a Thermo LTQ-FT mass spectrometer with an electrospray ionization source.



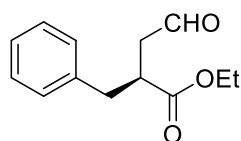
entry	ligand	CO/H <sub>2</sub> (bar)	conv.(%)	<b>2a</b> ee(%)
1	( <i>S</i> )-BINAP	5/5	11	10(R)
2	Xuphos	5/5	6	35
3	( <i>S</i> )-Segphos	5/5	34	32
4	( <i>S,S</i> )-Me-Duphos	5/5	14	53
5	Walphos	5/5	64	55
6	( <i>S</i> )-Synphos	5/5	28	33(R)
7	( <i>S</i> )-Binapine	5/5	>99	-
8	( <i>R<sub>c</sub></i> , <i>S<sub>p</sub></i> )-Duanphos	5/5	>99	76(R)
9	( <i>S,R</i> )-YanPhos	5/5	55	20
10	( <i>S,S</i> )-YanPhos	5/5	>99	54
11	( <i>S,S</i> )-DTB-YanPhos	5/5	>99	86
12	( <i>S,S</i> )-DTBM-YanPhos	5/5	>99	90
13	( <i>S,S</i> )-DTBM-YanPhos	10/10	90	90
14	( <i>S,S</i> )-DTBM-YanPhos	2.5/2.5	>99	90
15 <sup>b</sup>	( <i>S,S</i> )-DTBM-YanPhos	2.5/2.5	>99	90
16 <sup>c</sup>	( <i>S,S</i> )-DTBM-YanPhos	2.5/2.5	88	90
17 <sup>d</sup>	( <i>S,S</i> )-DTBM-YanPhos	2.5/2.5	>99	90
18 <sup>e</sup>	( <i>S,S</i> )-DTBM-YanPhos	2.5/2.5	93	86

$${}^b\text{T} = 80^\circ\text{C}, \quad {}^c\text{T} = 70^\circ\text{C}, \quad {}^d\text{L/Rh} = 2/1, \quad {}^e\text{L/Rh} = 1.5/1$$



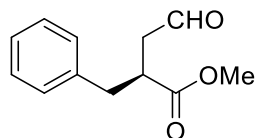
### 3. General procedure for AHF

In a glovebox filled with argon, to a 5 ml vial equipped with a magnetic bar was added (S,S)-DTBM-YanPhos (0.004 mmol) and Rh(acac)(CO)<sub>2</sub> (0.002 mmol in 1 mL toluene). After stirring for 10 min, the mixture was charged to substrate (0.2 mmol). The vial was transferred into an autoclave and taken out of the glovebox. The argon gas was replacement with hydrogen gas for three times, and then hydrogen (2.5 bar) and carbon monoxide (2.5 bar) were charged in sequence. The reaction mixture was stirred at 80 °C (oil bath) for 20 h. The reaction was cooled to room temperature and the pressure was carefully released in a well-ventilated hood. The solution was transferred into a solution of methyl 2-(triphenyl-λ<sup>4</sup>-phosphanyl)acetate (0.22 mmol) in 2 mL dichloromethane, the reaction mixture was stirred at 25 °C (oil bath) for 2 h. The solution was concentrated and the ester was isolated by column chromatography. The enantiomeric excesses of **2a-2f**, **2j-2l** and **2n-2w** were determined by HPLC analysis using a chiral stationary phase after the above-mentioned Wittig reaction, the enantiomeric excesses of **2g-2i** and **2m** were determined by HPLC analysis using a chiral stationary phase after reduced by NaBH<sub>4</sub>.

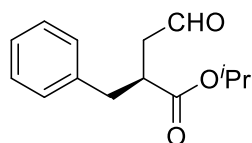


**ethyl (S)-2-benzyl-4-oxobutanoate (2a):**<sup>1</sup> 41.4 mg, colorless oil; isolated yield: 94%; 90% ee;  $[\alpha]_{\text{D}}^{25} = -20.6$  (c = 1.0, CHCl<sub>3</sub>). Ref 1:  $[\alpha]_{\text{D}}^{25} = +18$  (c = 0.91, CHCl<sub>3</sub>, (R)).

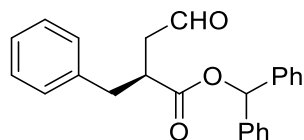
The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 14.8 min (minor), 17.0 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.70 (s, 1H), 7.31-7.28 (m, 2H), 7.24-7.21 (m, 1H), 7.17-7.15 (m, 2H), 4.12 (q,  $J$  = 7.1 Hz, 2H), 3.20-3.13 (m, 1H), 3.07 (dd,  $J$  = 13.5, 6.3 Hz, 1H), 2.87-2.73 (m, 2H), 2.54-2.48 (m, 1H), 1.20 (t,  $J$  = 7.1 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.0, 174.0, 138.1, 129.0, 128.5, 126.7, 60.8, 44.4, 40.9, 37.6, 14.0 ppm.



**methyl (S)-2-benzyl-4-oxobutanoate (2b):**<sup>2</sup> 34.2 mg, colorless oil; isolated yield: 83%; 89% ee;  $[\alpha]_D^{25}$  = -24.7 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 18.1 min (minor), 20.3 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.69 (s, 1H), 7.32-7.28 (m, 2H), 7.25-7.21 (m, 1H), 7.16-7.14 (m, 2H), 3.68 (s, 3H), 3.22-3.15 (m, 1H), 3.08 (dd,  $J$  = 13.6, 6.1 Hz, 1H), 2.88-2.73 (m, 2H), 2.52 (dd,  $J$  = 18.4, 4.5 Hz, 1H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.0, 174.5, 138.0, 128.9, 128.6, 126.8, 52.0, 44.3, 40.7, 37.5 ppm.



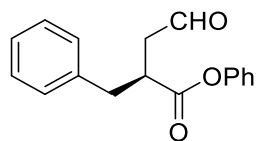
**isopropyl (S)-2-benzyl-4-oxobutanoate (2c):** 41.2 mg, colorless oil; isolated yield: 88%; 91% ee;  $[\alpha]_D^{25}$  = -20.0 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 11.7 min (major), 13.0 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.70 (s, 1H), 7.31-7.16 (m, 5H), 5.02-4.93 (m, 1H), 3.17-3.10 (m, 1H), 3.05 (dd,  $J$  = 13.5, 6.6 Hz, 1H), 2.85-2.72 (m, 2H), 2.50 (dd,  $J$  = 18.2, 4.6 Hz, 1H), 1.22 (d,  $J$  = 6.3 Hz, 3H), 1.13 (d,  $J$  = 6.3 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.1, 173.5, 138.1, 129.0, 128.5, 126.7, 68.2, 44.5, 41.1, 37.6, 21.7, 21.6 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{14}\text{H}_{18}\text{NaO}_3$  = 257.1148, found: 257.1152.



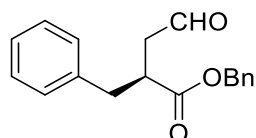
**benzhydryl (S)-2-benzyl-4-oxobutanoate (2d):** 53.8 mg, colorless oil; isolated yield: 75%; 90% ee;  $[\alpha]_D^{25}$  = -4.4 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 23.6 min (major), 27.1 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.67 (s, 1H), 7.36-7.19 (m, 13H), 7.09-7.07 (m, 2H), 6.85 (s, 1H), 3.38-3.31 (m, 1H), 3.09 (dd,  $J$  = 13.7, 6.6 Hz, 1H), 2.88-2.75 (m, 2H), 2.54 (dd,  $J$  =



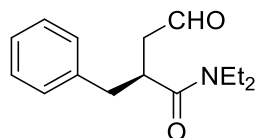
18.4, 4.8 Hz, 1H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.8, 173.2, 139.7, 139.7, 137.8, 129.0, 128.6, 128.4, 127.9, 127.2, 127.1, 126.8, 44.4, 40.9, 37.4 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{24}\text{H}_{22}\text{NaO}_3$  = 381.1461, found: 381.1459.



**phenyl (S)-2-benzyl-4-oxobutanoate (2e)**: 42.4 mg, colorless oil; isolated yield: 79%; 88% ee;  $[\alpha]_{\text{D}}^{25}$  = -26.1 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}}$  = 19.7 min (major), 21.8 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.77 (s, 1H), 7.36-7.32 (m, 4H), 7.27-7.19 (m, 4H), 6.96-6.94 (m, 2H), 3.44-3.37 (m, 1H), 3.17 (dd,  $J$  = 13.6, 6.9 Hz, 1H), 3.03-2.90 (m, 2H), 2.70 (dd,  $J$  = 18.6, 4.5 Hz, 1H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.7, 172.9, 150.5, 137.7, 129.4, 129.1, 128.7, 127.0, 125.9, 121.4, 44.8, 40.9, 37.7 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{17}\text{H}_{16}\text{NaO}_3$  = 291.0991, found: 291.0993.

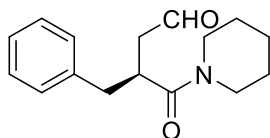


**benzyl (S)-2-benzyl-4-oxobutanoate (2f)**: 48.0 mg, colorless oil; isolated yield: 85%; 88% ee;  $[\alpha]_{\text{D}}^{25}$  = -10.2 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}}$  = 22.8 min (minor), 24.9 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.69 (s, 1H), 7.35-7.21 (m, 8H), 7.12-7.11 (m, 2H), 5.10 (s, 2H), 3.28-3.20 (m, 1H), 3.07 (dd,  $J$  = 13.6, 6.4 Hz, 1H), 2.89-2.75 (m, 2H), 2.53 (dd,  $J$  = 18.4, 4.7 Hz, 1H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.9, 173.9, 137.9, 135.6, 129.0, 128.6, 128.5, 128.2, 128.2, 126.8, 66.7, 44.4, 40.8, 37.5 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{18}\text{H}_{18}\text{NaO}_3$  = 305.1148, found: 305.1146.

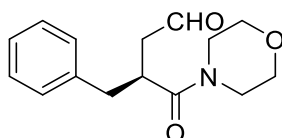


**(S)-2-benzyl-N,N-diethyl-4-oxobutanamide (2g)**: 39.6 mg, light yellow oil; isolated yield: 80%; 28% ee;  $[\alpha]_{\text{D}}^{25}$  = -59.7 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 95:5; flow rate = 1.0 mL/min; UV detection at 210 nm;  $t_{\text{R}}$  = 12.4 min (major), 19.8 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.72 (s, 1H), 7.30-7.17 (m, 5H), 3.48-3.39 (m, 1H), 3.35-3.28 (m, 1H), 3.24-3.07 (m, 4H), 2.94 (dd,  $J$  = 13.3, 7.7 Hz, 1H), 2.68 (dd,  $J$  = 13.3, 7.4 Hz, 1H), 2.54 (dd,  $J$  = 18.5, 4.2 Hz, 1H), 1.05 (t,  $J$  = 7.1 Hz, 6H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.9, 173.0, 138.7, 129.1, 128.5, 126.6, 46.6, 41.8, 40.5, 39.1, 37.5,

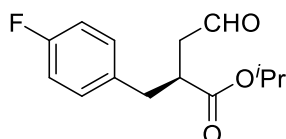
14.0, 12.8 ppm. **HRMS** calculated  $[M+H]^+$  for  $C_{15}H_{22}NO_2 = 248.1645$ , found: 248.1640.



**(S)-3-benzyl-4-oxo-4-(piperidin-1-yl)butanal (2h)**: 31.1 mg, light yellow oil; isolated yield: 60%; 75% ee;  $[\alpha]_D^{25} = -55.9$  ( $c = 1.0$ ,  $CHCl_3$ ). The enantiomeric excess was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 95:5; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R = 17.3$  min (major), 20.0 min (minor).  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  9.72 (s, 1H), 7.30-7.16 (m, 5H), 3.55-3.44 (m, 3H), 3.39-3.33 (m, 1H), 3.21-3.12 (m, 2H), 2.91 (dd,  $J = 13.2, 8.3$  Hz, 1H), 2.67 (dd,  $J = 13.2, 7.1$  Hz, 1H), 2.53 (dd,  $J = 18.6, 3.9$  Hz, 1H), 1.56-1.49 (m, 4H), 1.40-1.33 (m, 1H), 1.07-1.02 (m, 1H) ppm.  $^{13}C$  NMR (101 MHz,  $CDCl_3$ )  $\delta$  200.9, 172.0, 138.7, 129.0, 128.5, 126.6, 46.8, 46.6, 43.0, 38.9, 36.8, 25.9, 25.4, 24.4 ppm. **HRMS** calculated  $[M+H]^+$  for  $C_{16}H_{22}NO_2 = 260.1645$ , found: 260.1641.

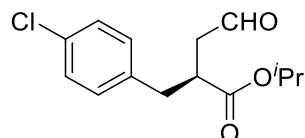


**(S)-3-benzyl-4-morpholino-4-oxobutanal (2i)**: 40.2 mg, light yellow oil; isolated yield: 77%; 86% ee;  $[\alpha]_D^{25} = -70.5$  ( $c = 1.0$ ,  $CHCl_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 210 nm;  $t_R = 11.7$  min (minor), 14.9 min (major).  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  9.73 (s, 1H), 7.31-7.15 (m, 5H), 3.62-3.57 (m, 2H), 3.55-3.50 (m, 1H), 3.48-3.36 (m, 4H), 3.22 (dd,  $J = 18.9, 9.5$  Hz, 1H), 3.10-3.04 (m, 1H), 2.93-2.84 (m, 2H), 2.72 (dd,  $J = 13.1, 6.1$  Hz, 1H), 2.63 (dd,  $J = 18.9, 3.7$  Hz, 1H) ppm.  $^{13}C$  NMR (101 MHz,  $CDCl_3$ )  $\delta$  200.6, 172.5, 138.5, 129.0, 128.6, 126.8, 66.5, 66.1, 47.1, 46.1, 42.1, 39.1, 36.5 ppm. **HRMS** calculated  $[M+H]^+$  for  $C_{15}H_{20}NO_3 = 262.1438$ , found: 262.1437.

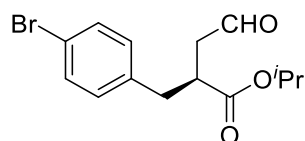


**isopropyl (S)-2-(4-fluorobenzyl)-4-oxobutanoate (2j)**: 37.3 mg, colorless oil; isolated yield: 74%; 90% ee;  $[\alpha]_D^{25} = -18.8$  ( $c = 1.0$ ,  $CHCl_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R = 8.7$  min (minor), 10.7 min (major).  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  9.72 (s, 1H), 7.15-7.11 (m, 2H), 7.01-6.95 (m, 2H), 5.01-4.92 (m, 1H), 3.14-3.07 (m, 1H), 2.99 (dd,  $J = 13.7, 7.0$  Hz, 1H), 2.86-2.73 (m, 2H), 2.52 (dd,  $J = 18.2, 4.9$  Hz, 1H), 1.21 (d,  $J = 6.3$  Hz, 3H), 1.12 (d,  $J = 6.3$  Hz, 3H) ppm.

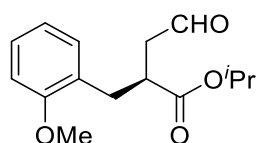
$^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.9, 173.4, 161.7 (d,  $J = 244.8$  Hz), 133.8 (d,  $J = 3.3$  Hz), 130.5 (d,  $J = 7.9$  Hz), 115.3 (d,  $J = 21.3$  Hz), 68.3, 44.6, 41.2 (d,  $J = 0.8$  Hz), 36.8, 21.6 (d,  $J = 8.1$  Hz) ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{14}\text{H}_{17}\text{FNaO}_3 = 275.1054$ , found: 275.1069.



**isopropyl (S)-2-(4-chlorobenzyl)-4-oxobutanoate (2k):** 41.9 mg, colorless oil; isolated yield: 78%; 90% ee;  $[\alpha]_{\text{D}}^{25} = -20.9$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}} = 9.5$  min (minor), 11.8 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.71 (s, 1H), 7.27-7.25 (m, 2H), 7.12-7.10 (m, 2H), 5.01-4.92 (m, 1H), 3.14-3.07 (m, 1H), 2.99 (dd,  $J = 13.6, 7.0$  Hz, 1H), 2.82 (dd,  $J = 18.2, 8.7$  Hz, 1H), 2.75 (dd,  $J = 13.6, 7.9$  Hz, 1H), 2.51 (dd,  $J = 18.2, 4.8$  Hz, 1H), 1.21 (d,  $J = 6.3$  Hz, 3H), 1.13 (d,  $J = 6.3$  Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.8, 173.3, 136.6, 132.5, 130.3, 128.6, 68.4, 44.5, 40.9, 36.9, 21.6, 21.6 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{14}\text{H}_{17}\text{ClNaO}_3 = 291.0758$ , found: 291.0762.

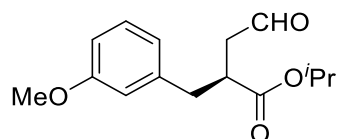


**isopropyl (S)-2-(4-bromobenzyl)-4-oxobutanoate (2l):** 48.2 mg, colorless oil; isolated yield: 77%; 90% ee;  $[\alpha]_{\text{D}}^{25} = -20.3$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}} = 10.3$  min (minor), 12.6 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.71 (s, 1H), 7.42-7.40 (m, 2H), 7.06-7.04 (m, 2H), 5.01-4.92 (m, 1H), 3.14-3.07 (m, 1H), 2.97 (dd,  $J = 13.7, 7.0$  Hz, 1H), 2.86-2.79 (m, 1H), 2.73 (dd,  $J = 13.7, 7.9$  Hz, 1H), 2.51 (dd,  $J = 18.2, 4.8$  Hz, 1H), 1.21 (d,  $J = 6.3$  Hz, 3H), 1.13 (d,  $J = 6.3$  Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.7, 173.2, 137.2, 131.6, 130.7, 120.5, 68.4, 44.5, 40.9, 36.9, 21.6, 21.6 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{14}\text{H}_{17}\text{BrNaO}_3 = 335.0253$ , found: 335.0248.

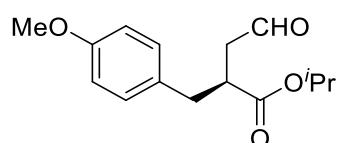


**isopropyl (S)-2-(2-methoxybenzyl)-4-oxobutanoate (2m):** 44.9 mg, colorless oil; isolated yield: 85%; 96% ee;  $[\alpha]_{\text{D}}^{25} = -22.7$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 95:5; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}} = 16.1$  min (minor), 18.5 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.68 (s, 1H), 7.23-7.19 (m, 1H), 7.09-7.07 (m, 1H), 6.88-

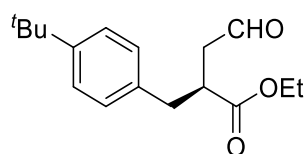
6.83 (m, 2H), 5.00-4.91 (m, 1H), 3.82 (s, 3H), 3.25-3.16 (m, 1H), 3.02 (dd,  $J = 13.3$ , 6.7 Hz, 1H), 2.83-2.75 (m, 2H), 2.49 (dd,  $J = 18.1$ , 4.6 Hz, 1H), 1.21 (d,  $J = 6.3$  Hz, 3H), 1.12 (d,  $J = 6.3$  Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.5, 173.9, 157.5, 130.8, 128.0, 126.4, 120.3, 110.2, 68.0, 55.1, 44.7, 39.5, 32.4, 21.6, 21.5 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{15}\text{H}_{20}\text{NaO}_4 = 287.1254$ , found: 287.1254.



**isopropyl (S)-2-(3-methoxybenzyl)-4-oxobutanoate (2n)**: 42.3 mg, colorless oil; isolated yield: 80%; 91% ee;  $[\alpha]_{\text{D}}^{25} = -14.8$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 99:1; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}} = 41.0$  min (major), 45.7 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.70 (s, 1H), 7.20 (t,  $J = 7.9$  Hz, 1H), 6.78-6.71 (m, 3H), 5.04-4.94 (m, 1H), 3.79 (s, 3H), 3.16-3.09 (m, 1H), 3.03 (dd,  $J = 13.5$ , 6.4 Hz, 1H), 2.82 (dd,  $J = 18.2$ , 9.0 Hz, 1H), 2.72 (dd,  $J = 13.5$ , 8.6 Hz, 1H), 2.51 (dd,  $J = 18.2$ , 4.5 Hz, 1H), 1.23 (d,  $J = 6.3$  Hz, 3H), 1.16 (d,  $J = 6.3$  Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.1, 173.5, 159.6, 139.7, 129.5, 121.3, 114.7, 112.0, 68.3, 55.1, 44.4, 41.0, 37.6, 21.6, 21.6 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{15}\text{H}_{20}\text{NaO}_4 = 287.1254$ , found: 287.1259.

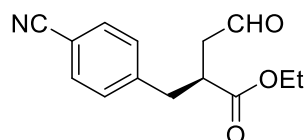


**isopropyl (S)-2-(4-methoxybenzyl)-4-oxobutanoate (2o)**: 43.3 mg, colorless oil; isolated yield: 82%; 90% ee;  $[\alpha]_{\text{D}}^{25} = -15.2$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_{\text{R}} = 12.2$  min (minor), 14.8 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.69 (s, 1H), 7.08 (d,  $J = 8.6$  Hz, 2H), 6.83 (d,  $J = 8.6$  Hz, 2H), 5.03-4.93 (m, 1H), 3.78 (s, 3H), 3.12-3.05 (m, 1H), 2.99 (dd,  $J = 13.6$ , 6.5 Hz, 1H), 2.84-2.77 (m, 1H), 2.70 (dd,  $J = 13.6$ , 8.4 Hz, 1H), 2.49 (dd,  $J = 18.1$ , 4.5 Hz, 1H), 1.22 (d,  $J = 6.3$  Hz, 3H), 1.15 (d,  $J = 6.3$  Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.2, 173.6, 158.3, 130.1, 130.0, 113.8, 68.2, 55.2, 44.4, 41.3, 36.7, 21.6, 21.6 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{15}\text{H}_{20}\text{NaO}_4 = 287.1254$ , found: 287.1264.

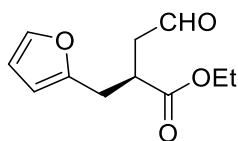


**ethyl (S)-2-(4-(tert-butyl)benzyl)-4-oxobutanoate (2p)**: 47.0 mg, colorless oil; isolated yield: 85%; 88% ee;  $[\alpha]_{\text{D}}^{25} = -22.3$  ( $c = 1.0$ ,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 95:5; flow

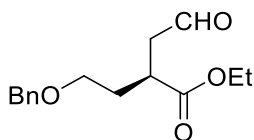
rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 6.1 min (minor), 9.2 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.70 (s, 1H), 7.32-7.30 (m, 2H), 7.10-7.08 (m, 2H), 4.13 (q,  $J$  = 7.1 Hz, 2H), 3.18-3.11 (m, 1H), 3.04 (dd,  $J$  = 13.6, 6.2 Hz, 1H), 2.87-2.79 (m, 1H), 2.73 (dd,  $J$  = 13.6, 8.7 Hz, 1H), 2.51 (dd,  $J$  = 18.2, 4.4 Hz, 1H), 1.30 (s, 9H), 1.20 (t,  $J$  = 7.1 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.2, 174.2, 149.6, 134.9, 128.6, 125.4, 60.8, 44.4, 40.9, 37.1, 34.4, 31.3, 14.0 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{17}\text{H}_{24}\text{NaO}_3$  = 299.1618, found: 299.1618.



**ethyl (S)-2-(4-cyanobenzyl)-4-oxobutanoate (2q)**: 29.4 mg, colorless oil; isolated yield: 60%; 88% ee;  $[\alpha]_D^{25}$  = -23.5 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 90:10; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 17.1 min (major), 20.3 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.74 (s, 1H), 7.61-7.59 (m, 2H), 7.31-7.29 (m, 2H), 4.13-4.07 (m, 2H), 3.23-3.16 (m, 1H), 3.07 (dd,  $J$  = 13.6, 7.4 Hz, 1H), 2.91-2.85 (m, 2H), 2.57 (dd,  $J$  = 18.4, 5.3 Hz, 1H), 1.18 (t,  $J$  = 7.1 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.3, 173.4, 143.9, 132.3, 129.8, 118.7, 110.7, 61.1, 44.5, 40.4, 37.5, 14.0 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{14}\text{H}_{15}\text{NNaO}_3$  = 268.0944, found: 298.0961.

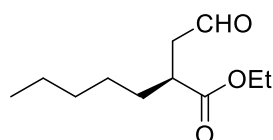


**ethyl (S)-2-(furan-2-ylmethyl)-4-oxobutanoate (2r)**: 34.1 mg, colorless oil; isolated yield: 81%; 88% ee;  $[\alpha]_D^{25}$  = -10.8 ( $c$  = 0.5,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 10.9 min (minor), 14.6 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.71 (s, 1H), 7.32-7.31 (m, 1H), 6.28-6.27 (m, 1H), 6.06 (d,  $J$  = 3.1 Hz, 1H), 4.16 (q,  $J$  = 7.1 Hz, 2H), 3.28-3.21 (m, 1H), 3.06 (dd,  $J$  = 15.0, 5.8 Hz, 1H), 2.93-2.84 (m, 2H), 2.59 (dd,  $J$  = 18.3, 5.0 Hz, 1H), 1.24 (t,  $J$  = 7.1 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.8, 173.5, 151.9, 141.7, 110.2, 107.2, 61.0, 44.2, 38.5, 29.7, 14.1 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{11}\text{H}_{14}\text{NaO}_4$  = 233.0784, found: 233.0781.

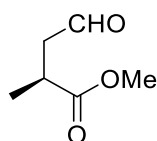


**ethyl (S)-4-(benzyloxy)-2-(2-oxoethyl)butanoate (2s)**: 44.4 mg, colorless oil; isolated yield: 84%; 89% ee;  $[\alpha]_D^{25}$  = -12.8 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow

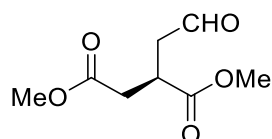
rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 16.2 min (minor), 18.0 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.73 (s, 1H), 7.36-7.27 (m, 5H), 4.50-4.44 (m, 2H), 4.14-4.09 (m, 2H), 3.51 (t,  $J$  = 6.1 Hz, 2H), 3.11-3.05 (m, 1H), 2.87 (dd,  $J$  = 18.0, 8.6 Hz, 1H), 2.61 (dd,  $J$  = 18.0, 5.0 Hz, 1H), 2.06-1.98 (m, 1H), 1.86-1.78 (m, 1H), 1.23 (t,  $J$  = 7.1 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.1, 174.5, 138.1, 128.3, 127.6, 127.6, 72.9, 67.4, 60.7, 45.1, 36.4, 31.5, 14.1 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{15}\text{H}_{20}\text{NaO}_4$  = 287.1254, found: 287.1251.



**ethyl (S)-2-(2-oxoethyl)heptanoate (2t)**: 33.2 mg, colorless oil; isolated yield: 83%; 88% ee;  $[\alpha]_D^{25}$  = -9.9 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 5.3 min (minor), 6.0 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.77 (s, 1H), 4.18-4.13 (m, 2H), 2.92-2.84 (m, 2H), 2.59-2.51 (m, 1H), 1.68-1.61 (m, 1H), 1.54-1.47 (m, 1H), 1.29-1.25 (m, 9H), 0.88 (t,  $J$  = 6.8 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.5, 174.9, 60.7, 45.4, 39.0, 31.9, 31.5, 26.6, 22.4, 14.2, 14.0 ppm. **HRMS** calculated  $[\text{M}+\text{Na}]^+$  for  $\text{C}_{11}\text{H}_{20}\text{NaO}_3$  = 223.1305, found: 223.1305.

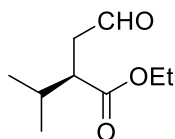


**methyl (S)-2-methyl-4-oxobutanoate (2u)**:<sup>1</sup> 23.9 mg, colorless oil; isolated yield: 92%; 93% ee;  $[\alpha]_D^{25}$  = -8.1 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R$  = 8.4 min (minor), 11.5 min (major).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.77 (s, 1H), 3.70 (s, 3H), 3.04-2.97 (m, 1H), 2.92 (dd,  $J$  = 17.8, 7.9 Hz, 1H), 2.55 (dd,  $J$  = 17.8, 5.3 Hz, 1H), 1.24 (d,  $J$  = 7.0 Hz, 3H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  200.1, 175.6, 52.0, 46.9, 33.5, 17.0 ppm.



**dimethyl (R)-2-(2-oxoethyl)succinate (2v)**: 34.3 mg, light yellow oil; isolated yield: 91%; 86% ee;  $[\alpha]_D^{25}$  = -0.4 ( $c$  = 1.0,  $\text{CHCl}_3$ ). The enantiomeric excess was determined by HPLC on Chiralpak AD-H column, hexane: isopropanol = 99:1; flow rate = 0.5 mL/min; UV detection at 220 nm;  $t_R$  = 42.4 min (major), 43.9 min (minor).  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.77 (s, 1H), 3.71 (d,  $J$  = 7.5 Hz, 6H), 3.38-3.31 (m, 1H), 2.98 (dd,  $J$  = 18.4, 6.8 Hz, 1H), 2.80-2.72 (m, 2H), 2.61 (dd,  $J$  = 16.8, 6.6 Hz, 1H) ppm.  $^{13}\text{C}$  NMR (101 MHz,  $\text{CDCl}_3$ )  $\delta$  199.4, 173.6, 171.8, 52.4, 52.0, 44.4, 35.1, 34.9 ppm. **HRMS**

calculated  $[M+Na]^+$  for  $C_8H_{12}NaO_5 = 211.0577$ , found: 211.0575.

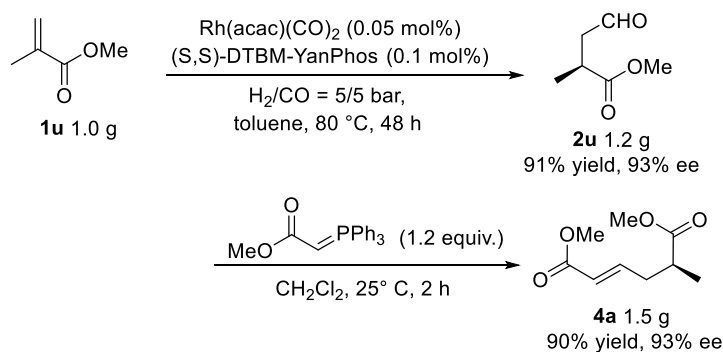


**ethyl (*R*)-2-isopropyl-4-oxobutanoate (2w):**<sup>1</sup> 29.6 mg, colorless oil; isolated yield: 86%; 73% ee;  $[\alpha]_D^{25} = -8.4$  ( $c = 0.25$ ,  $CHCl_3$ ). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm;  $t_R = 5.8$  min (minor), 11.4 min (major).  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  9.80 (s, 1H), 4.20-4.12 (m, 2H), 2.92 (dd,  $J = 17.9, 10.4$  Hz, 1H), 2.80- 2.75 (m, 1H), 2.51 (dd,  $J = 17.9, 3.4$  Hz, 1H), 2.08-2.00 (m, 1H), 1.27 (t,  $J = 7.1$  Hz, 3H), 0.94 (dd,  $J = 9.0, 7.0$  Hz, 6H) ppm.  $^{13}C$  NMR (101 MHz,  $CDCl_3$ )  $\delta$  200.8, 174.2, 60.5, 45.1, 42.3, 29.8, 20.1, 19.4, 14.2 ppm.

#### 4. Procedures for gram-scale AHF of **1u** and the synthesis of **4a**

A stock solution was made by mixing (*S,S*)-DTBM-YanPhos (0.01 mmol) with  $Rh(acac)(CO)_2$  (0.005 mmol) in toluene (2 mL) at room temperature for 10 min in a argon-filled glovebox. Then, the catalyst solution was transferred by syringe into a 5 mL vial charged with substrate **1u** (10 mmol, 1.0 g). The vial was transferred into an autoclave and taken out of the glovebox. The argon gas was replacement with hydrogen gas for three times, and then hydrogen (5 bar) and carbon monoxide (5 bar) were charged in sequence. The reaction mixture was stirred at 80 °C (oil bath) for 48 h. The reaction was cooled to room temperature and the pressure was carefully released in a well-ventilated hood. The solution was concentrated and **2u** was isolated by column chromatography. Isolated yield: 91%, 1.2 g.

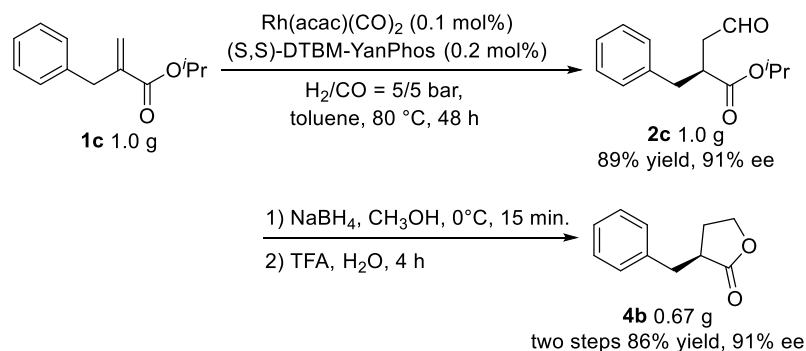
**4a** was prepared according to the literature.<sup>3</sup> To a solution of the chiral aldehyde **2u** (9.1 mmol, 1.2 g) with  $CH_2Cl_2$  (5 mL) in a 25 ml flask, methyl 2-(triphenyl- $\lambda^4$ -phosphanyl)acetate (10 mmol, 3.3 g) was added, the mixture was allowed to stirred at 25 °C for 2 hours. The organic solvents were removed under reduced pressure and the residue was purified by flash chromatography to give the desired product **4a** (1.5 g, 90% yield) with 93% ee.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  6.92-6.85 (m, 1H), 5.87 (d,  $J = 15.7$  Hz, 1H), 3.73 (s, 3H), 3.69 (s, 3H), 2.65-2.54 (m, 2H), 2.37-2.29 (m, 1H), 1.19 (d,  $J = 6.9$  Hz, 3H) ppm.  $^{13}C$  NMR (101 MHz,  $CDCl_3$ )  $\delta$  175.8, 145.8, 122.9, 51.8, 51.5, 38.4, 35.8, 29.7, 16.8 ppm.



## 5. Procedures for gram-scale AHF of **1c** and the synthesis of **4b**

A stock solution was made by mixing (*S,S*)-DTBM-YanPhos (0.01 mmol) with Rh(acac)(CO)<sub>2</sub> (0.005 mmol) in toluene (2 mL) at room temperature for 10 min in a argon-filled glovebox. Then, the catalyst solution was transferred by syringe into a 5 mL vial charged with substrate **1c** (5 mmol, 1.0 g). The vial was transferred into an autoclave and taken out of the glovebox. The argon gas was replacement with hydrogen gas for three times, and then hydrogen (5 bar) and carbon monoxide (5 bar) were charged in sequence. The reaction mixture was stirred at 80 °C (oil bath) for 48 h. The reaction was cooled to room temperature and the pressure was carefully released in a well-ventilated hood. The solution was concentrated and **2c** was isolated by column chromatography. Isolated yield: 89%, 1.0 g.

**4b** was prepared according to the literature.<sup>4</sup> To a solution of NaBH<sub>4</sub> (9 mmol, 0.34 g) with 5 mL CH<sub>3</sub>OH in a 25 mL flask, **2c** was added dropwise at 0 °C, and the mixture was stirred for 15 minutes at 0 °C. Water was added dropwise to quench the reaction, and the mixture was concentrated to remove methanol and then was extracted with ethyl acetate (3 × 5 ml), dried over anhydrous MgSO<sub>4</sub> followed by evaporation. The crude product was dissolved in 5 mL trifluoroacetic acid and 2.5 mL water. The mixture was stirred at room temperature for 4 hours. Saturated sodium bicarbonate solution was added dropwise to consume the excess trifluoroacetic acid, then the mixture was extracted with ethyl acetate (3 × 10 ml), and the combined extracts were washed with brine, and then dried over anhydrous MgSO<sub>4</sub> followed by evaporation. The residue was purified by a silica-gel column chromatography (petroleum ether / ethyl acetate, 10:1 by volume) to yield compound **4b** in the form of a colorless oil. Two steps yield: 86%, 91% ee. [ $\alpha$ ]<sub>D</sub><sup>25</sup> = +52.5 (c = 0.25, CHCl<sub>3</sub>). The enantiomeric excess was determined by HPLC on Chiralcel OD-H column, hexane: isopropanol = 98:2; flow rate = 1.0 mL/min; UV detection at 220 nm; t<sub>R</sub> = 29.7 min (major), 33.8 min (minor). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  7.33-7.20 (m, 5H), 4.26-4.21 (m, 1H), 4.18-4.12 (m, 1H), 3.26 (dd, *J* = 13.6, 4.0 Hz, 1H), 2.89-2.81 (m, 1H), 2.75 (dd, *J* = 13.6, 9.5 Hz, 1H), 2.29-2.21 (m, 1H), 2.05-1.94 (m, 1H) ppm. <sup>13</sup>C NMR (101 MHz, CDCl<sub>3</sub>)  $\delta$  178.7, 138.4, 128.8, 128.7, 126.7, 66.5, 41.1, 36.1, 28.0 ppm.

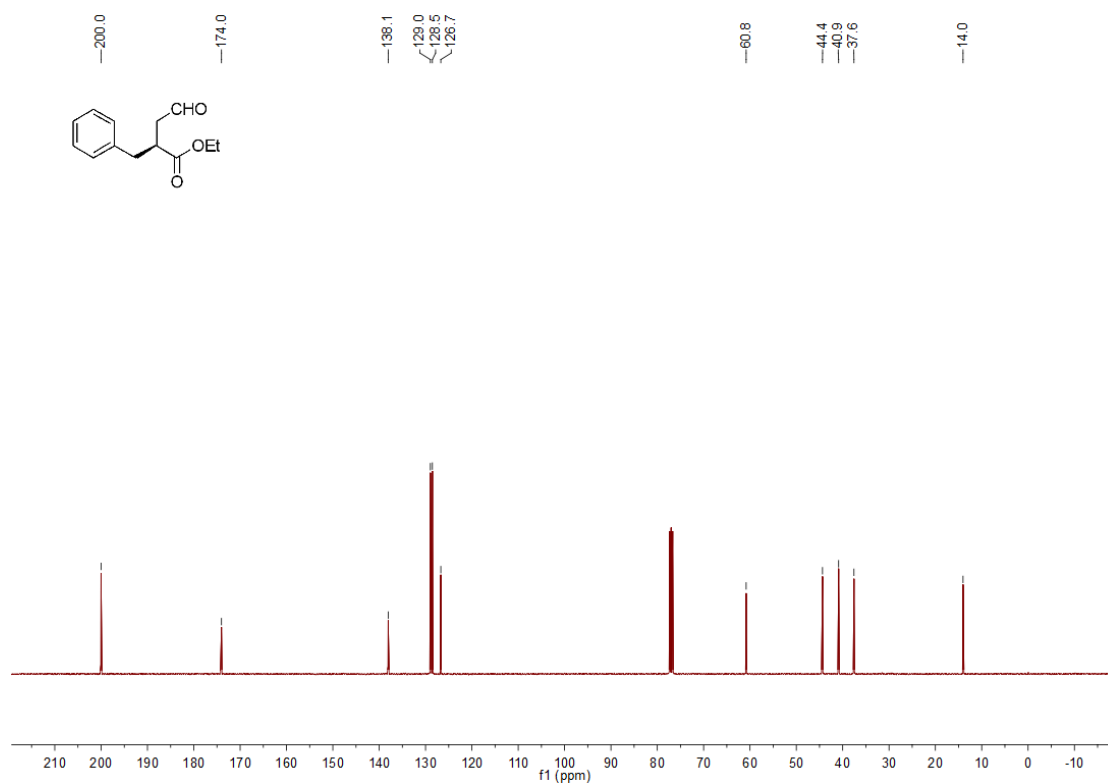
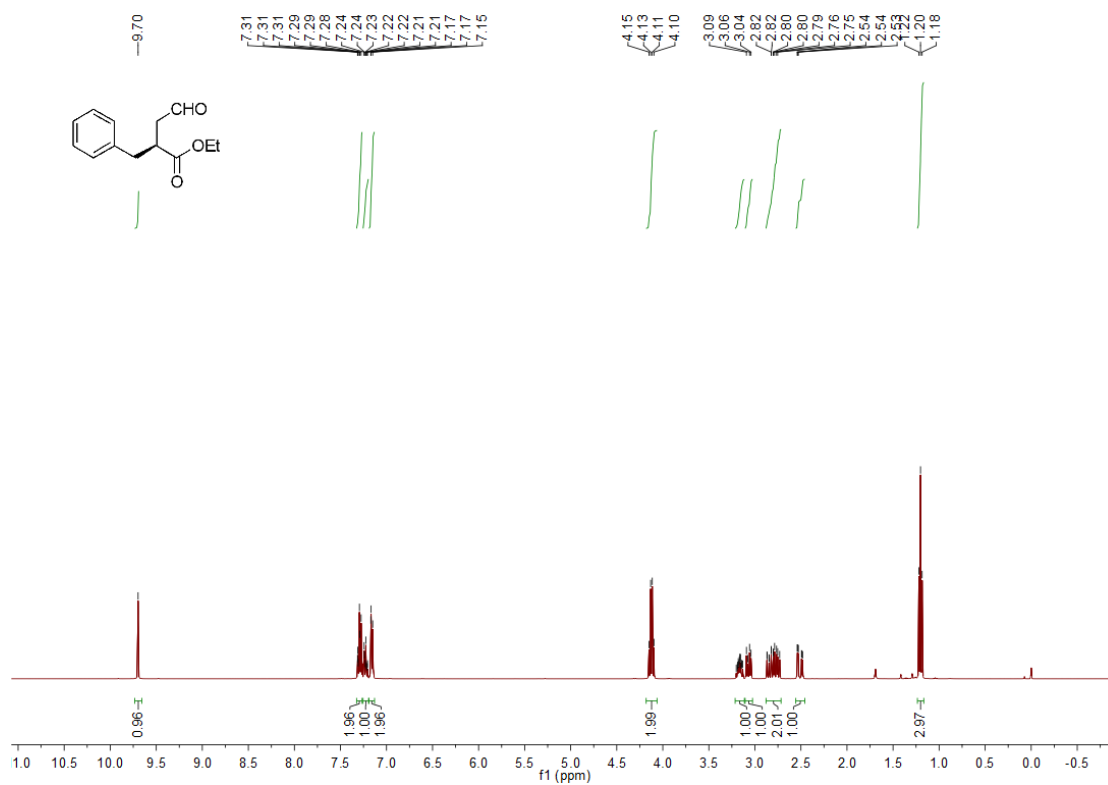
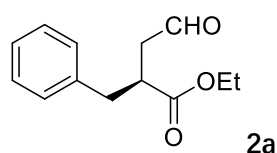


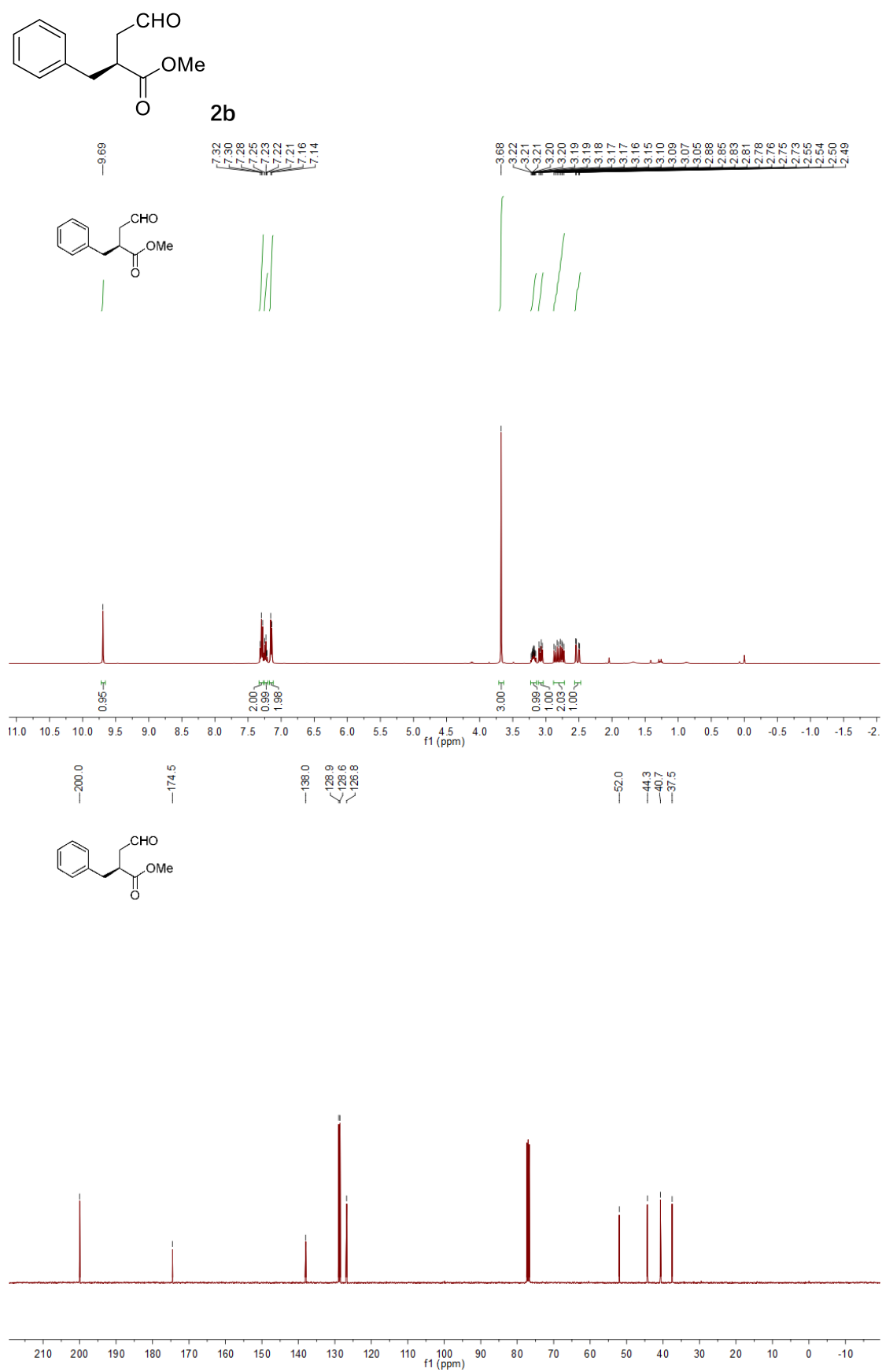


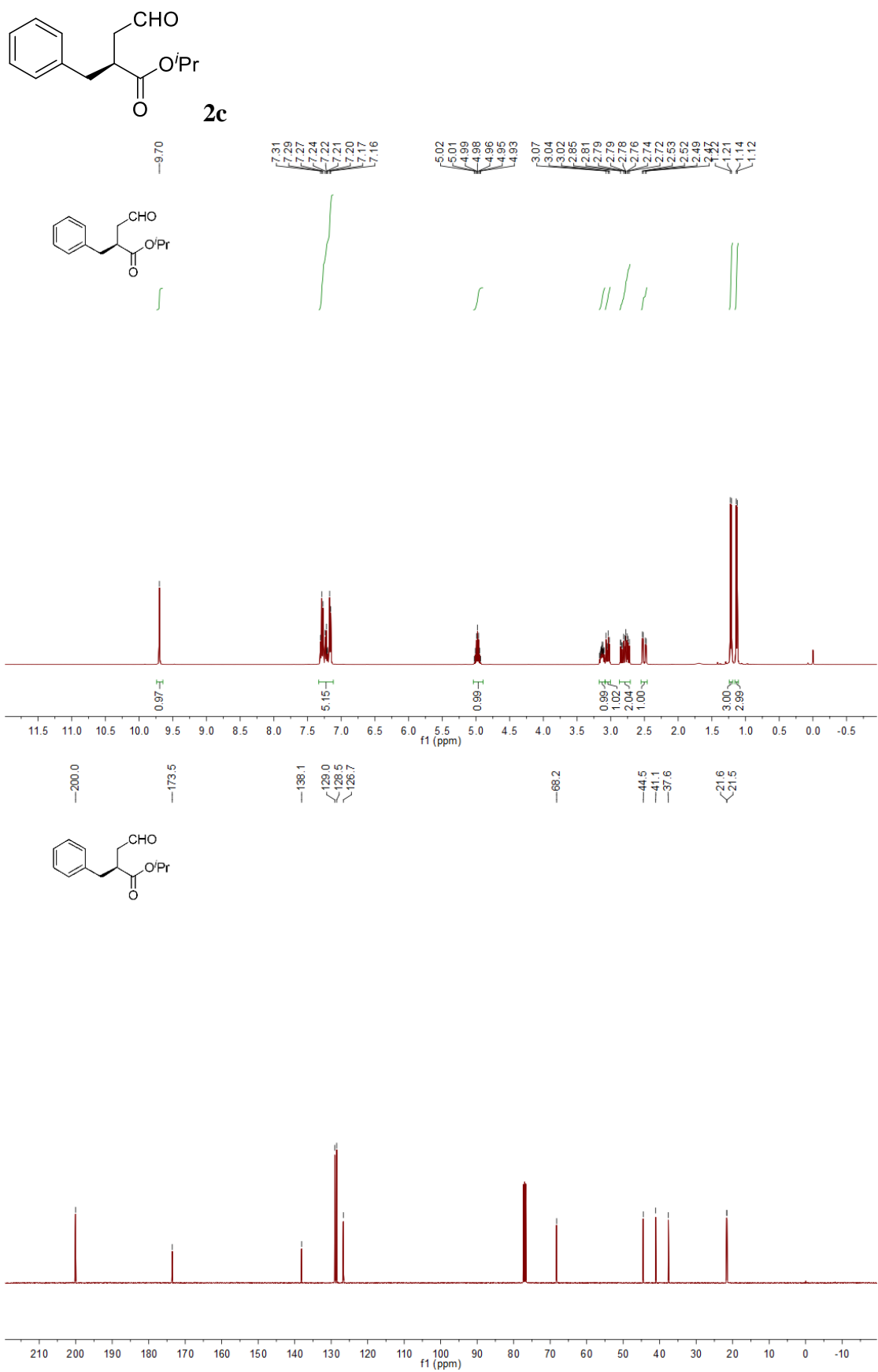
## 6. References

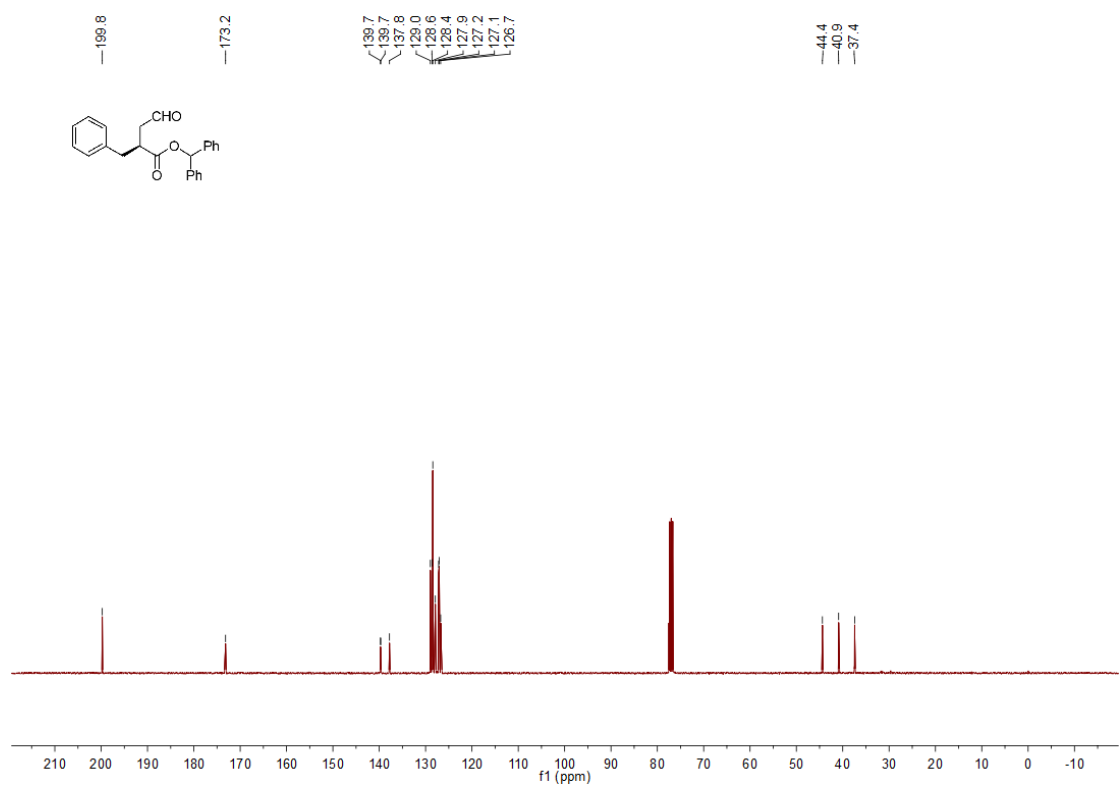
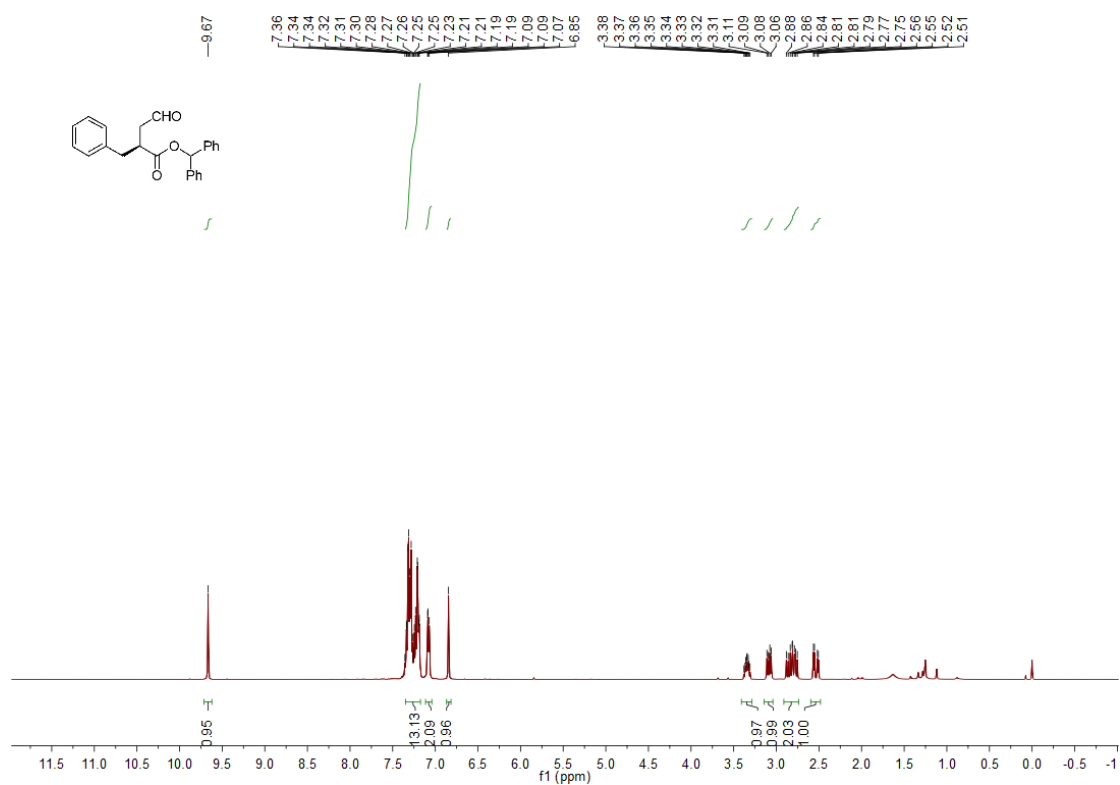
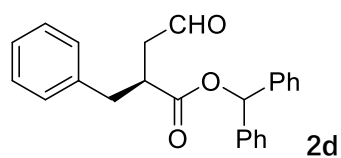
- (1) Wang, X.; Buchwald, S. L. Rh-Catalyzed Asymmetric Hydroformylation of Functionalized 1,1-Disubstituted Olefins. *J. Am. Chem. Soc.* **2011**, *133*, 19080.
- (2) Zhang, C.; Maeda, Y.; Sato, Y. *Chem. Pharm. Bull.* **1998**, *46*, 572.
- (3) Breit, B.; Zahn, S. K. Domino Hydroformylation-Wittig Reactions. *Angew. Chem. Int. Ed.* **1999**, *38*, 969.
- (4) Sadhukhan, S.; Zhang, G-F.; Tochtrop, G. P. Modular Isotopomer Synthesis of  $\gamma$ -Hydroxybutyric Acid for a Quantitative Analysis of Metabolic Fates. *ACS Chem. Biol.* **2014**, *9*, 1706.

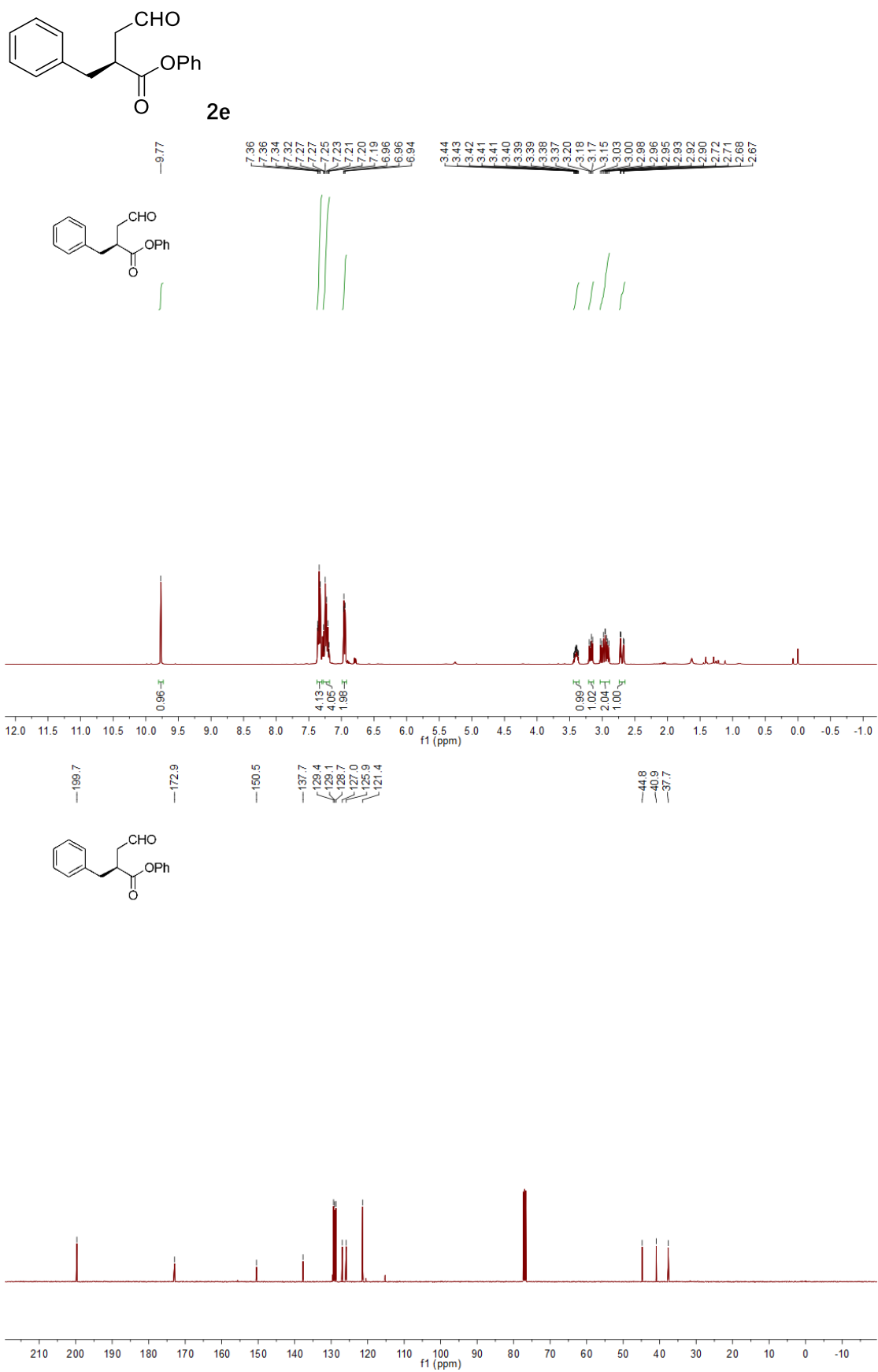
## 7. NMR spectra

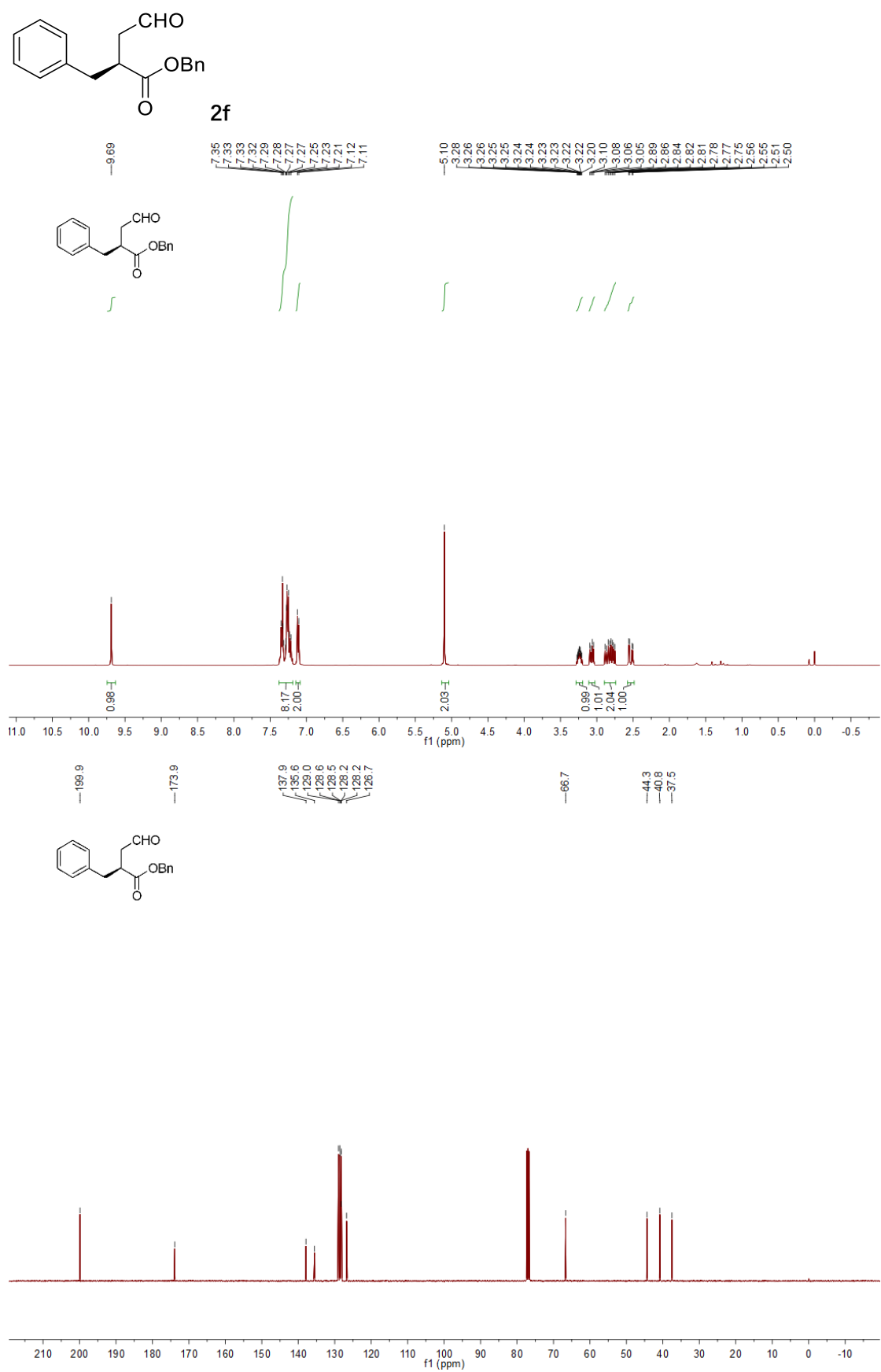


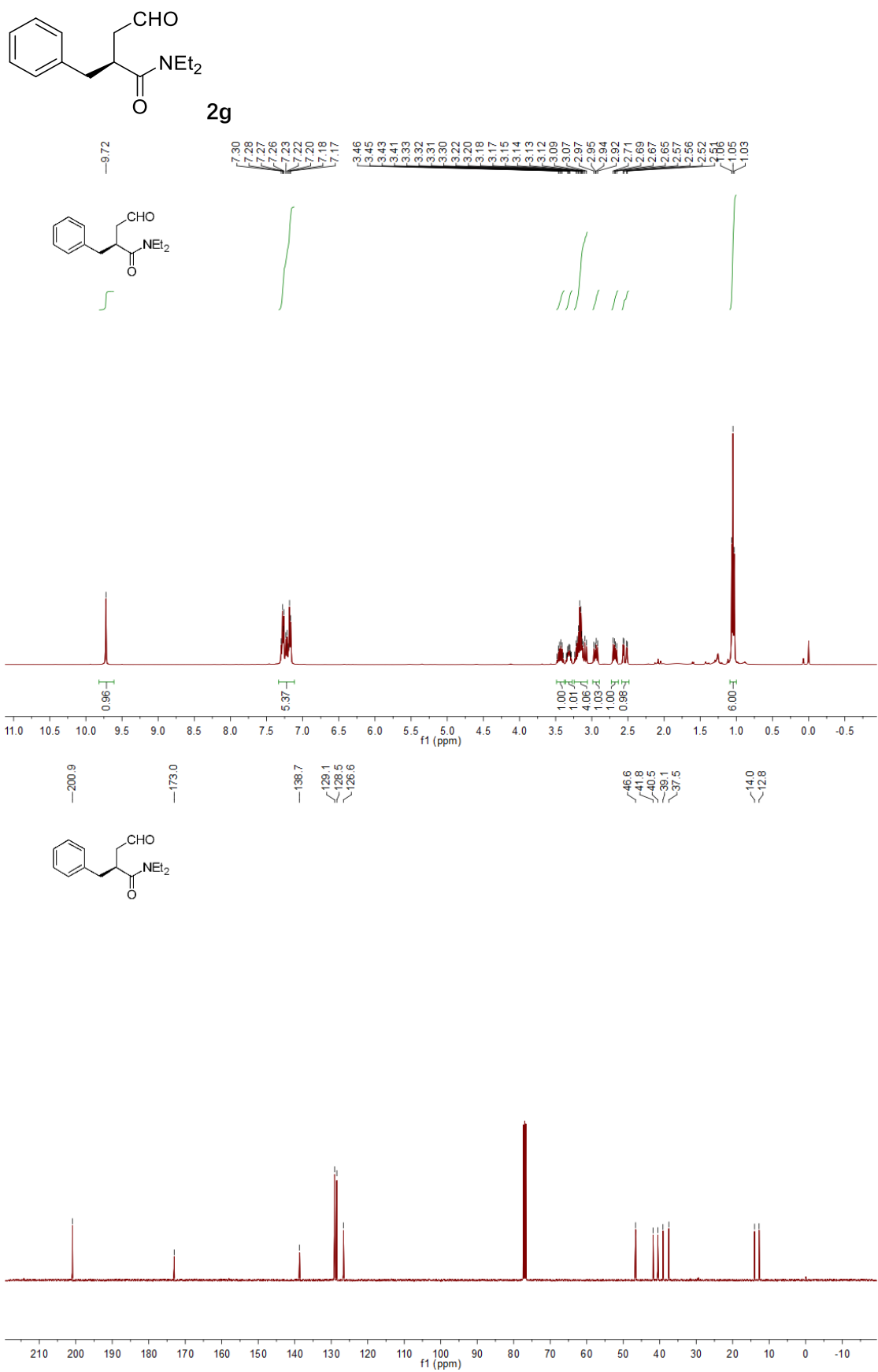




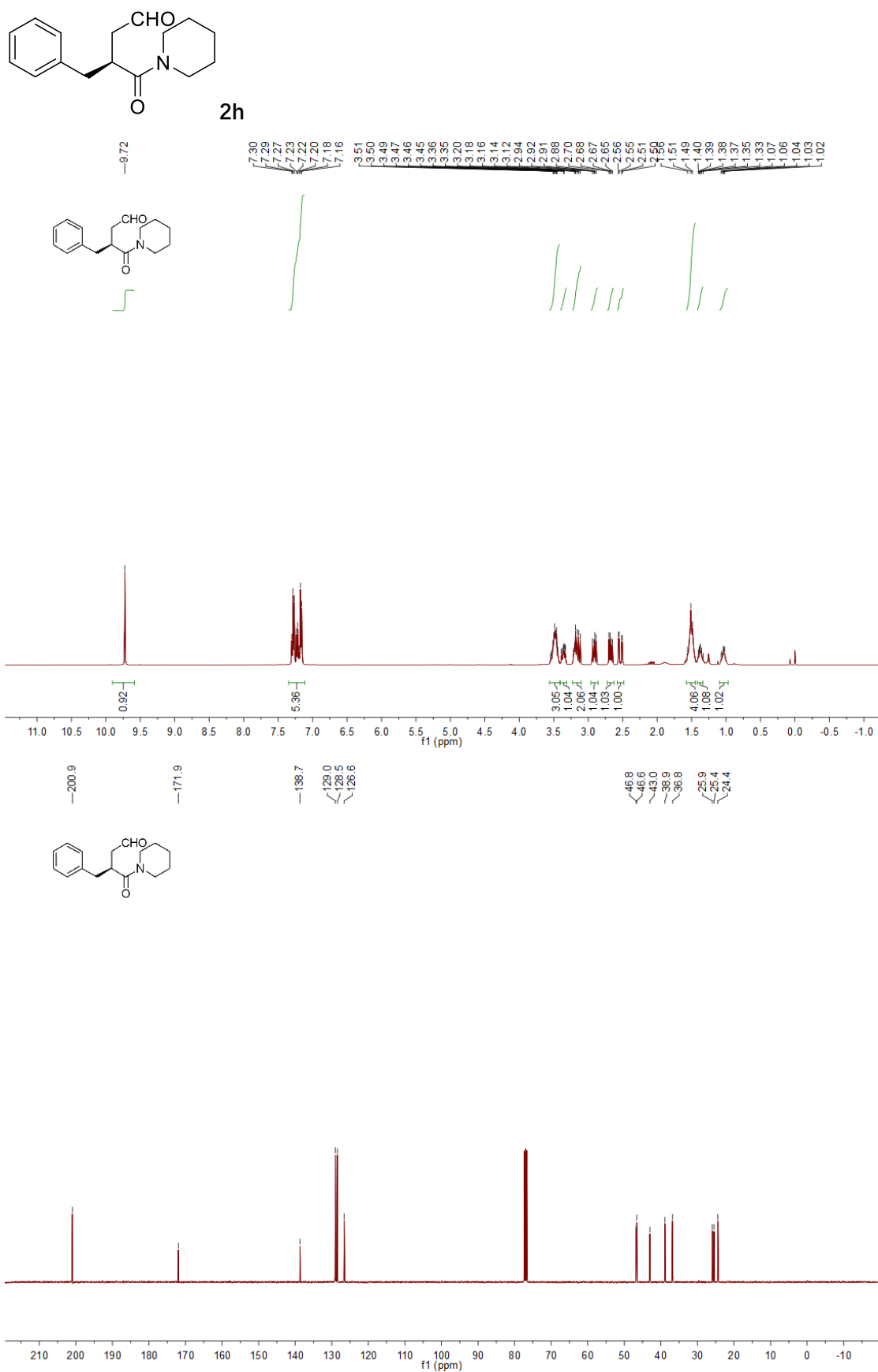


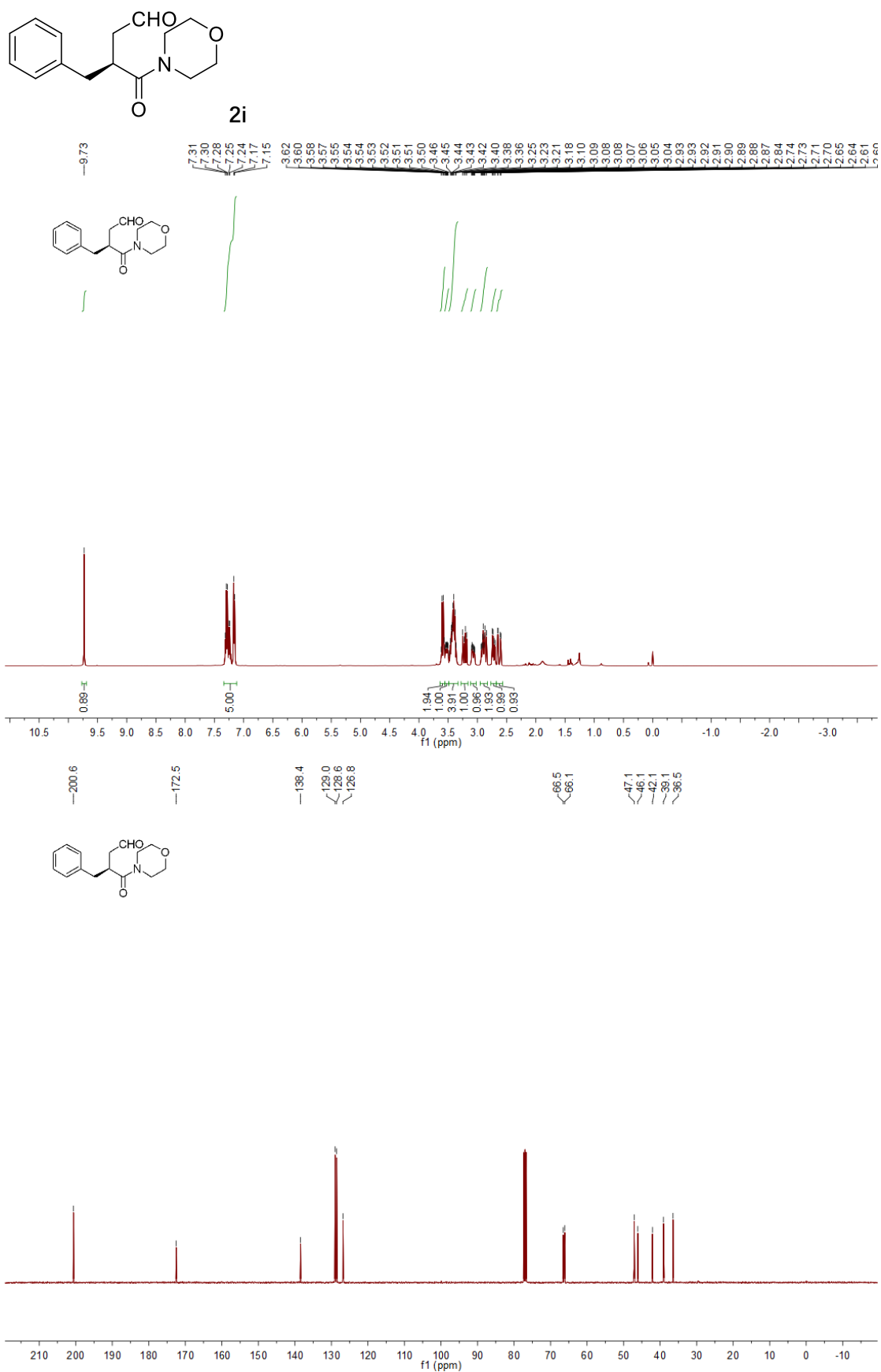


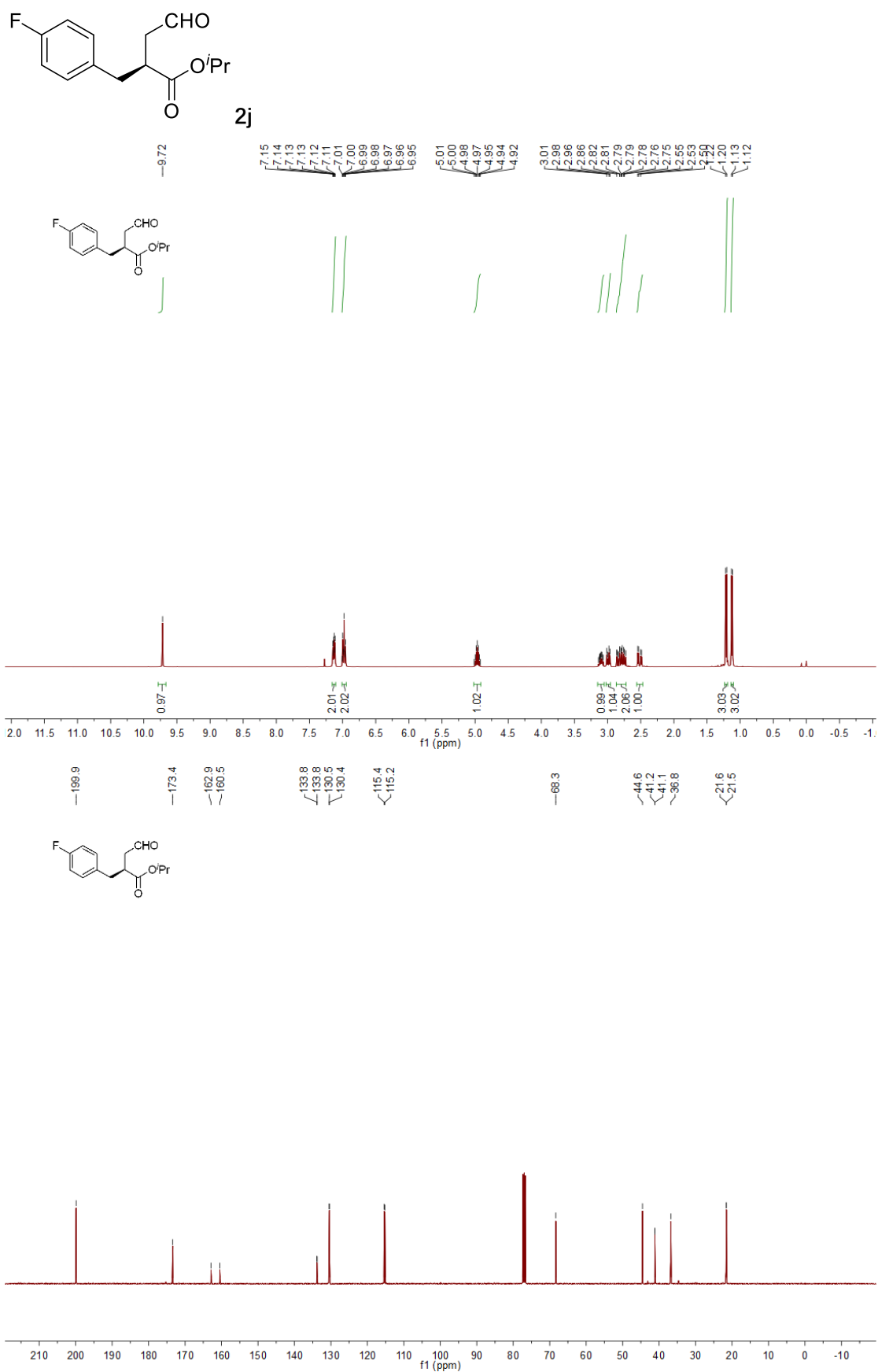


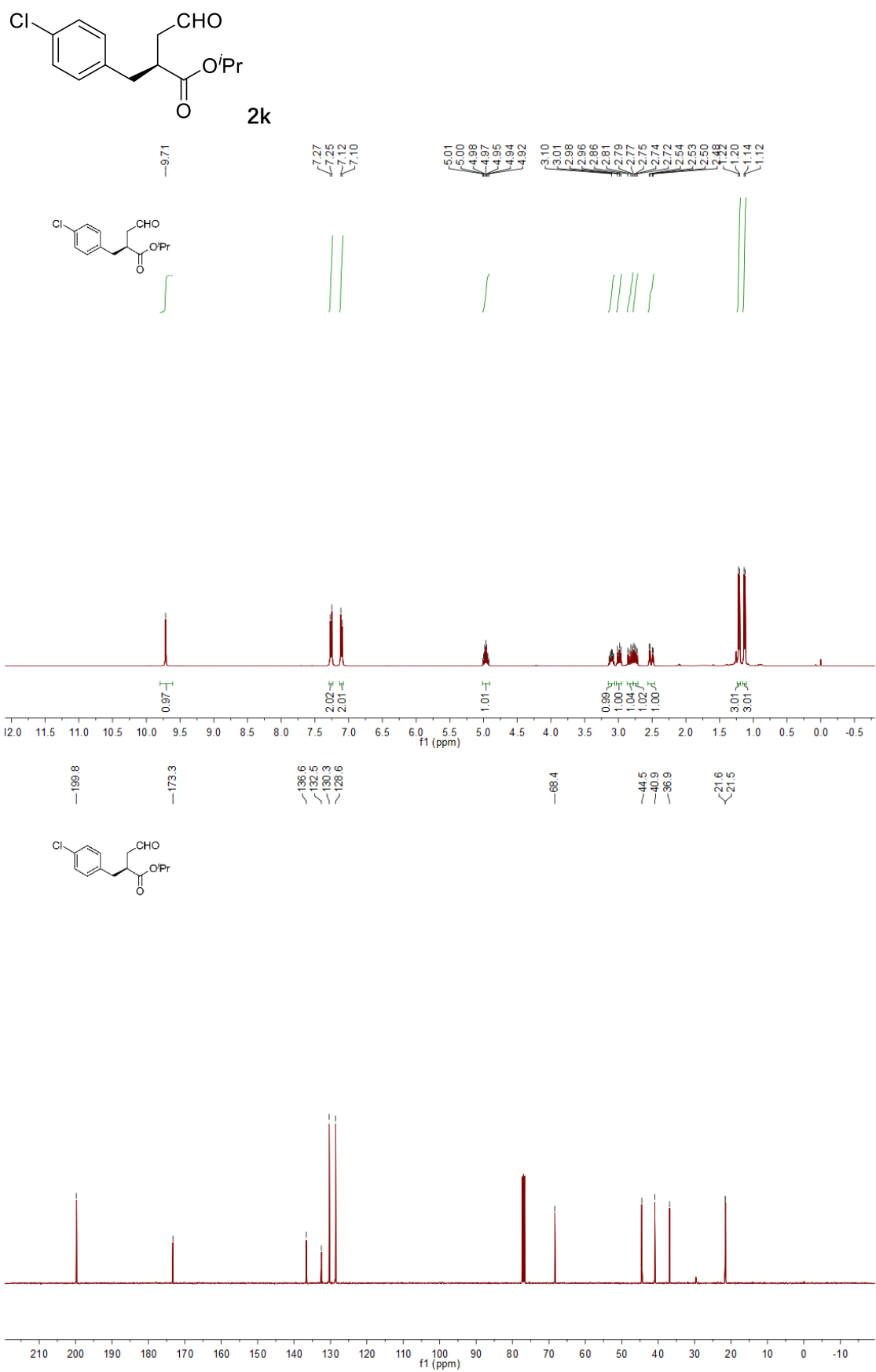


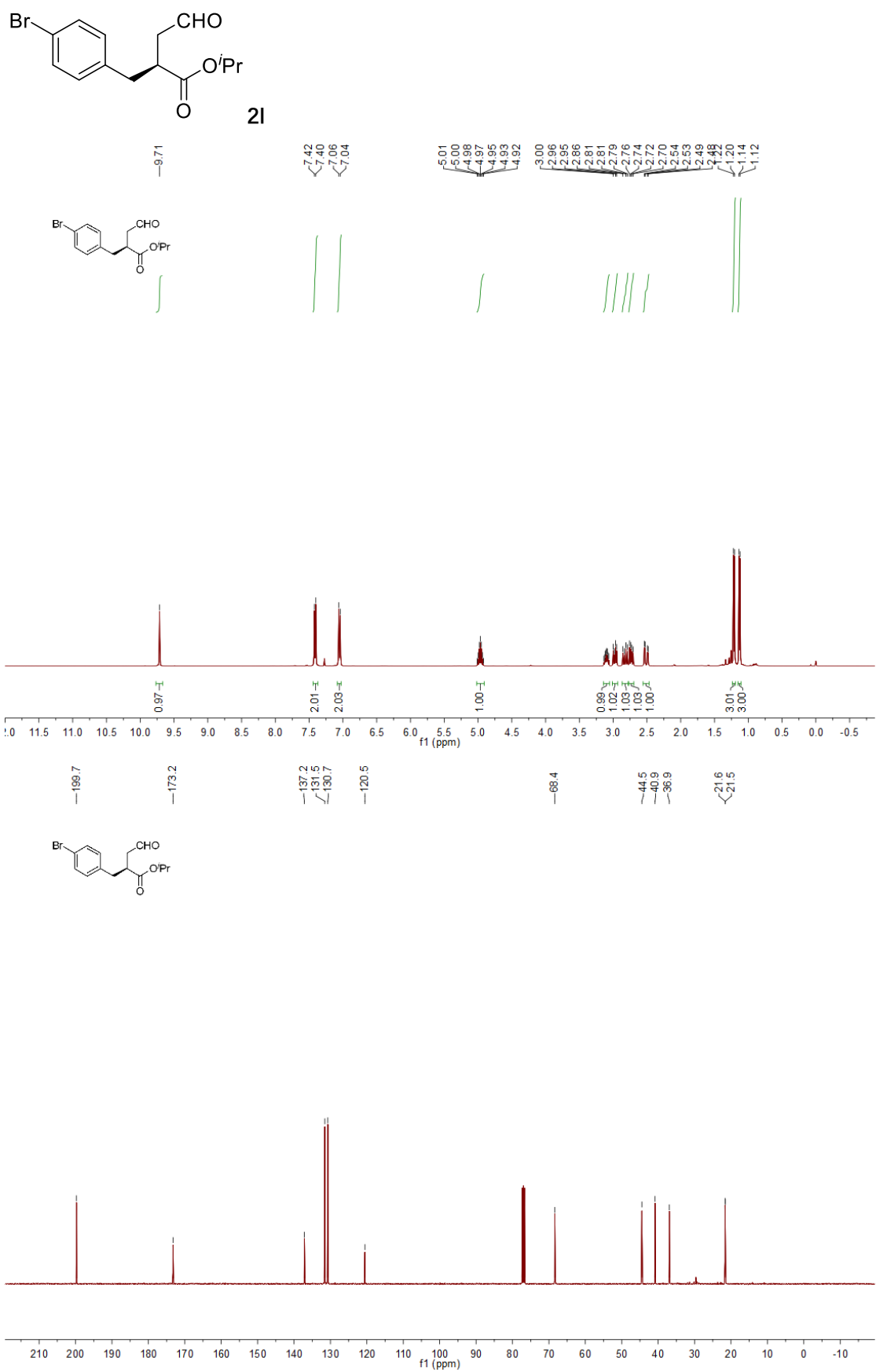


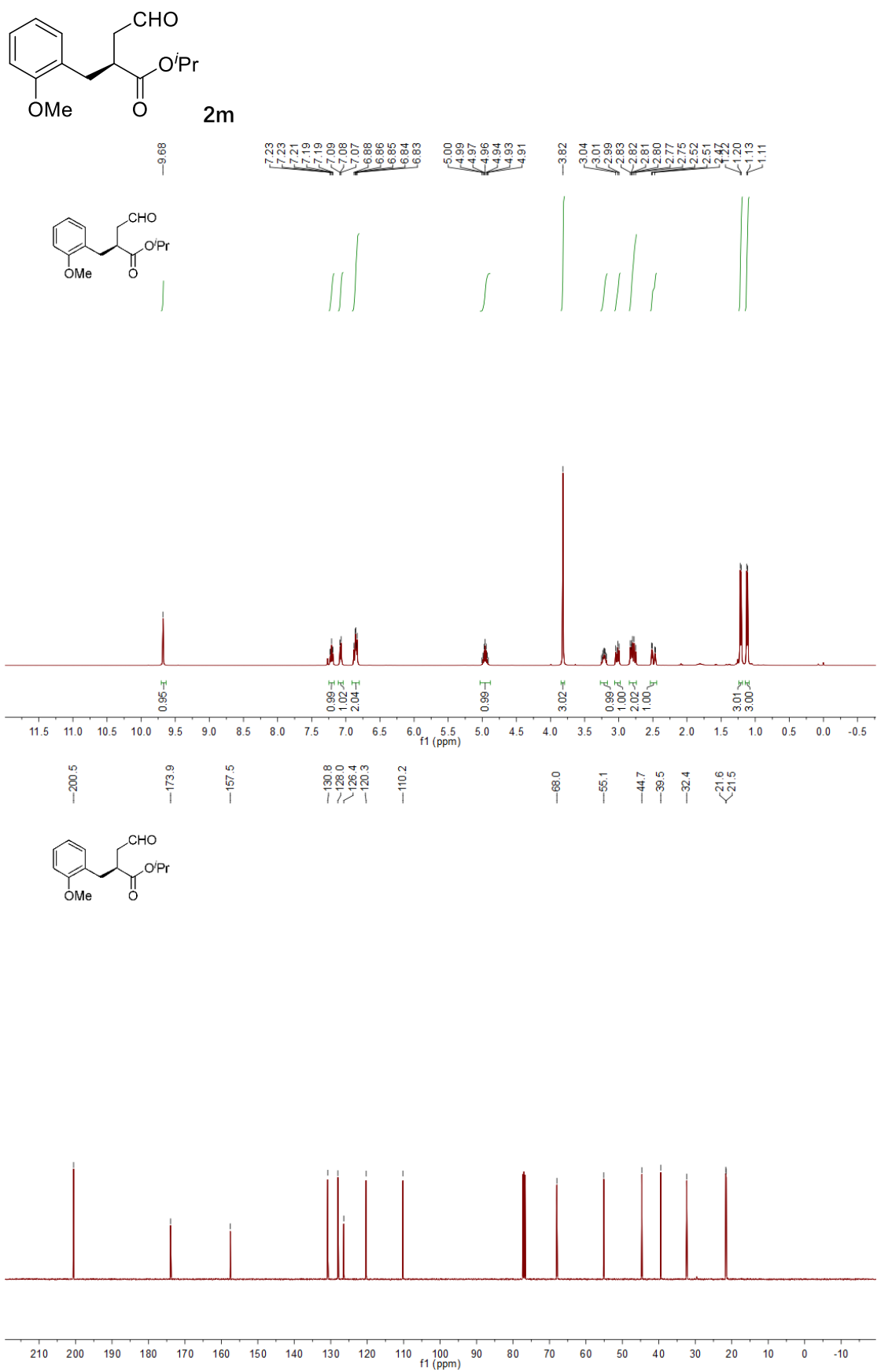


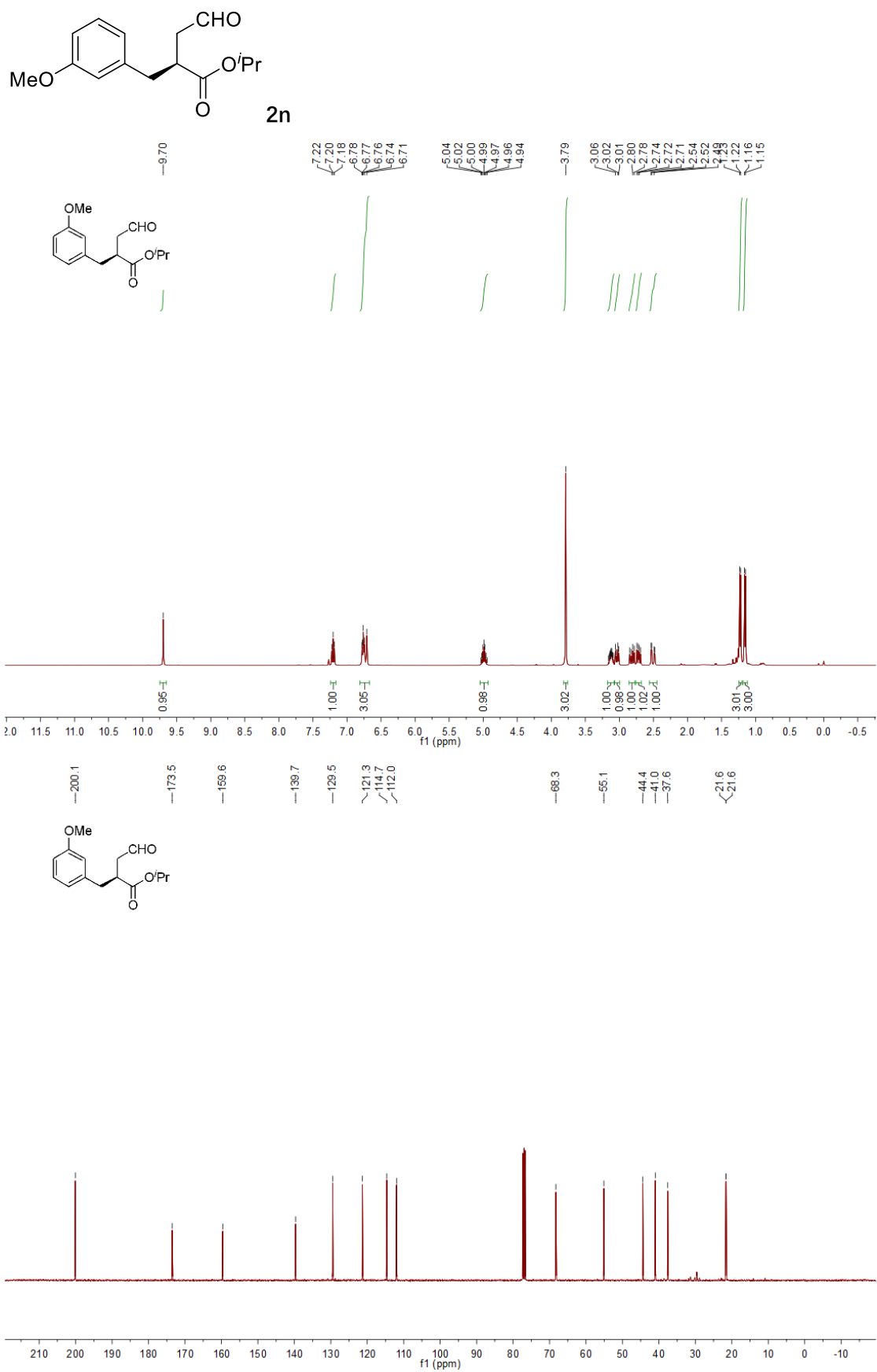


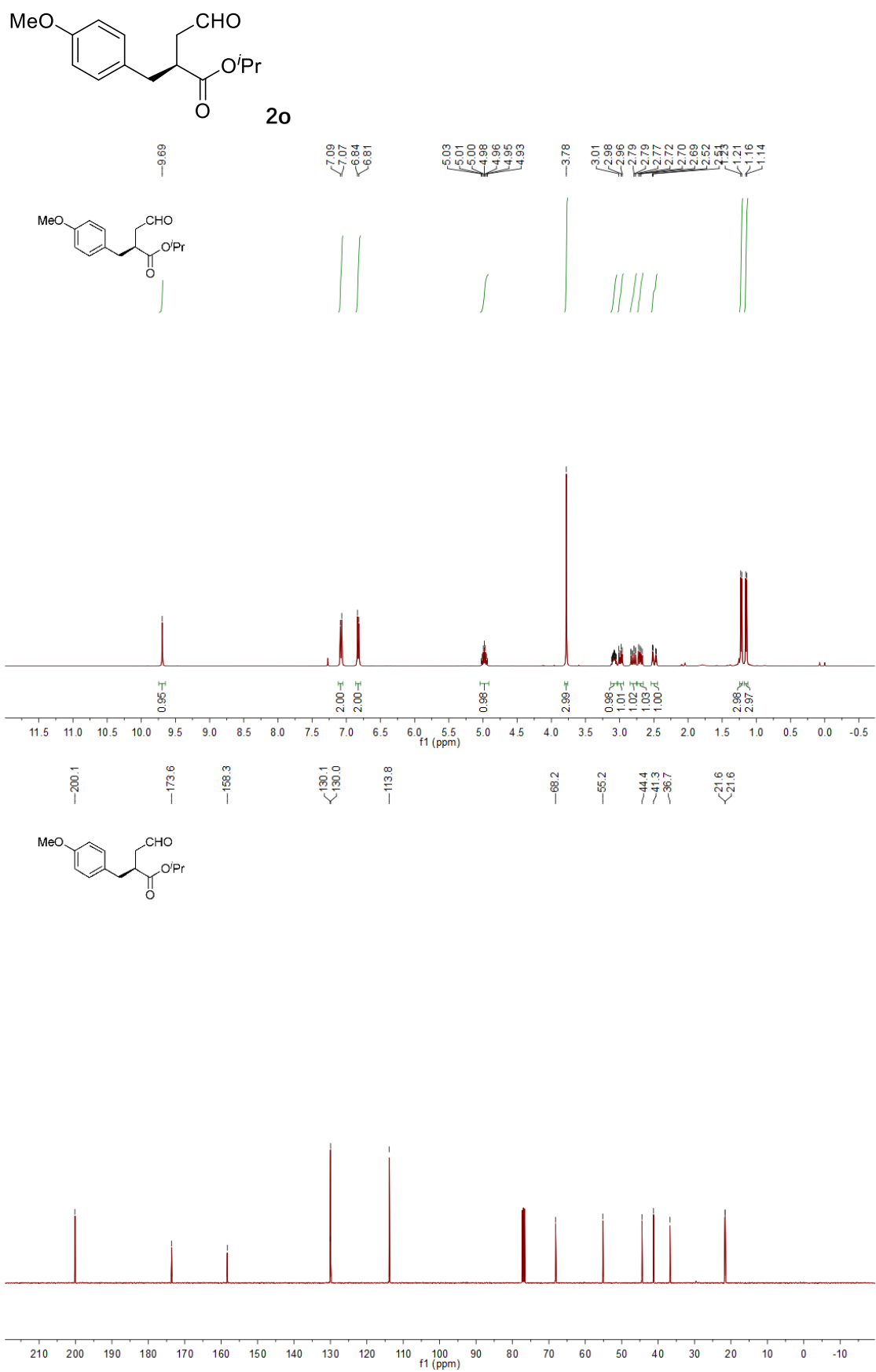




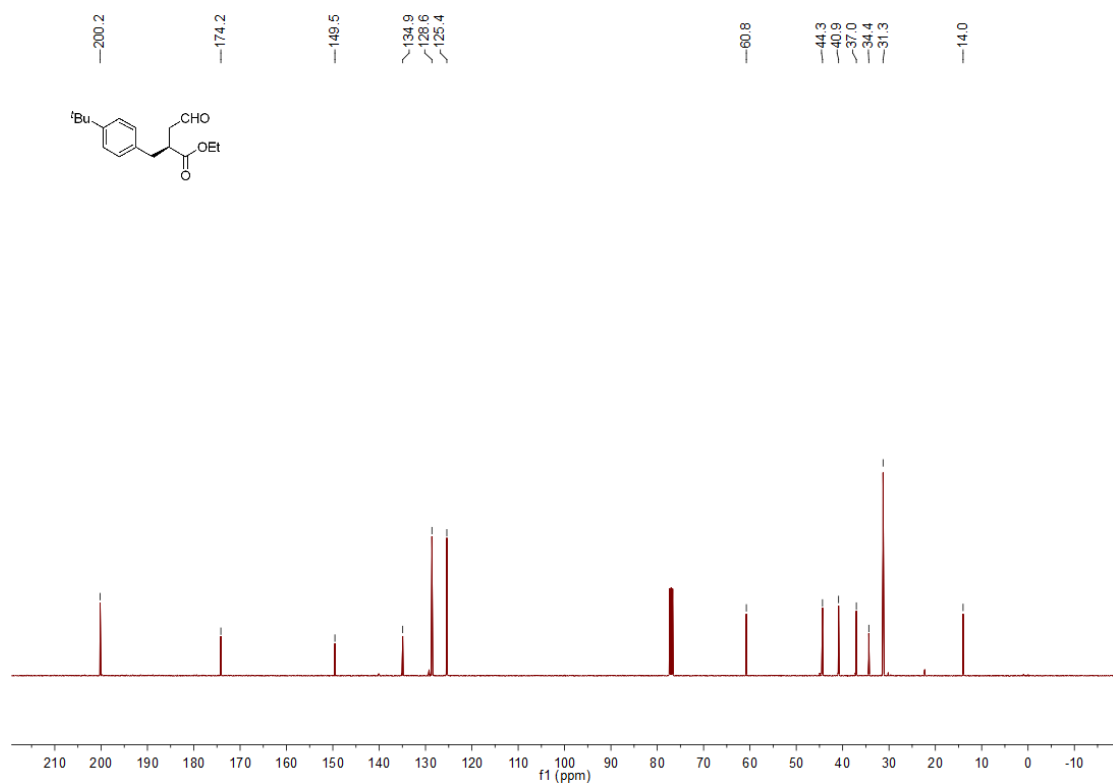
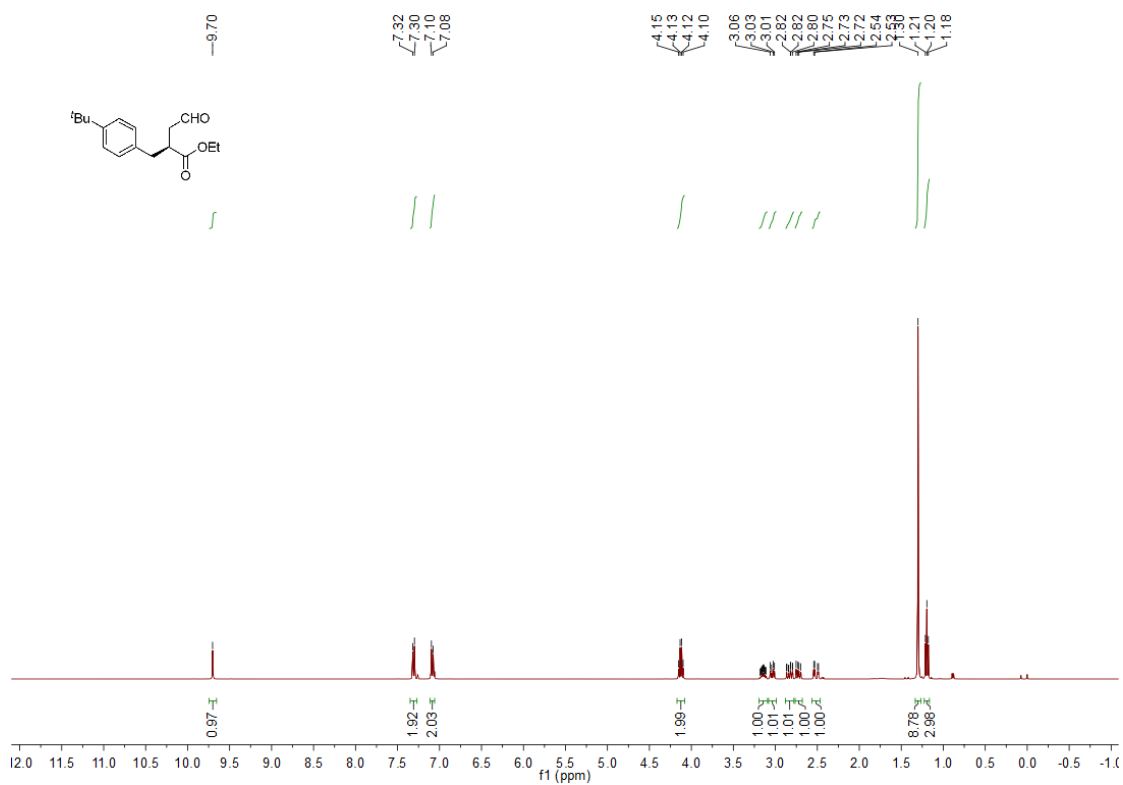
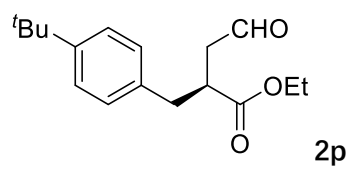


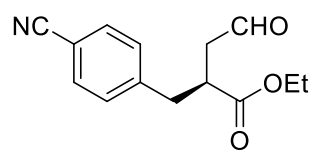




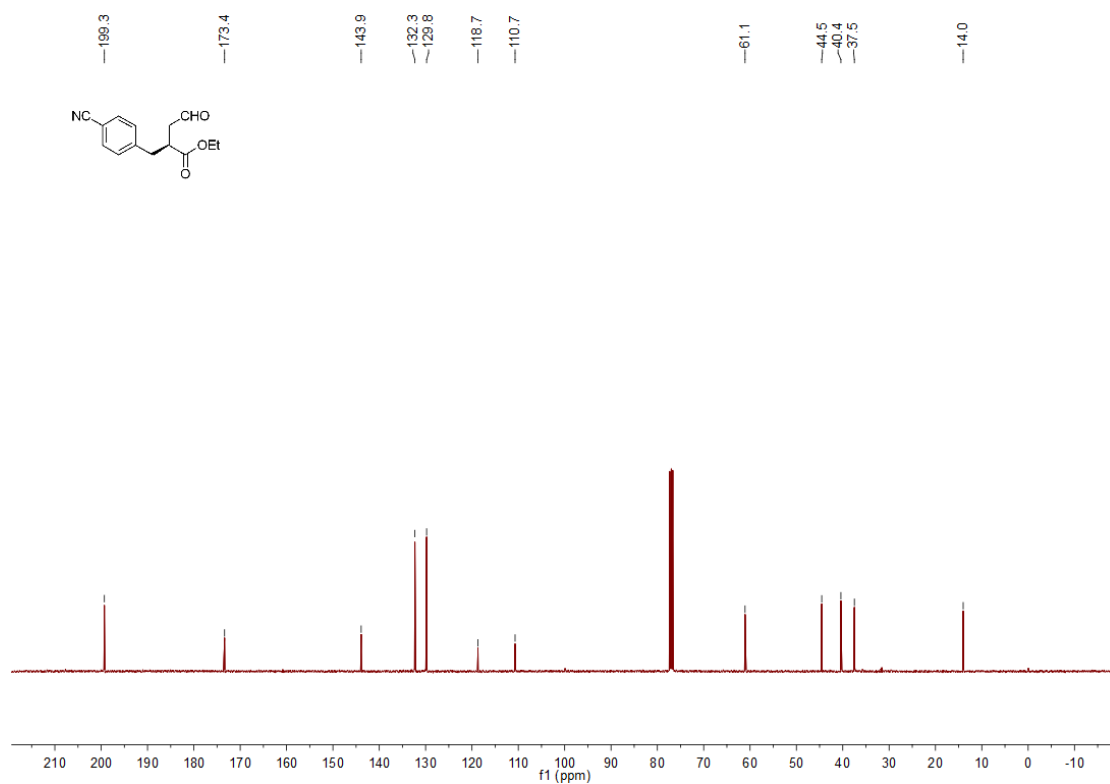
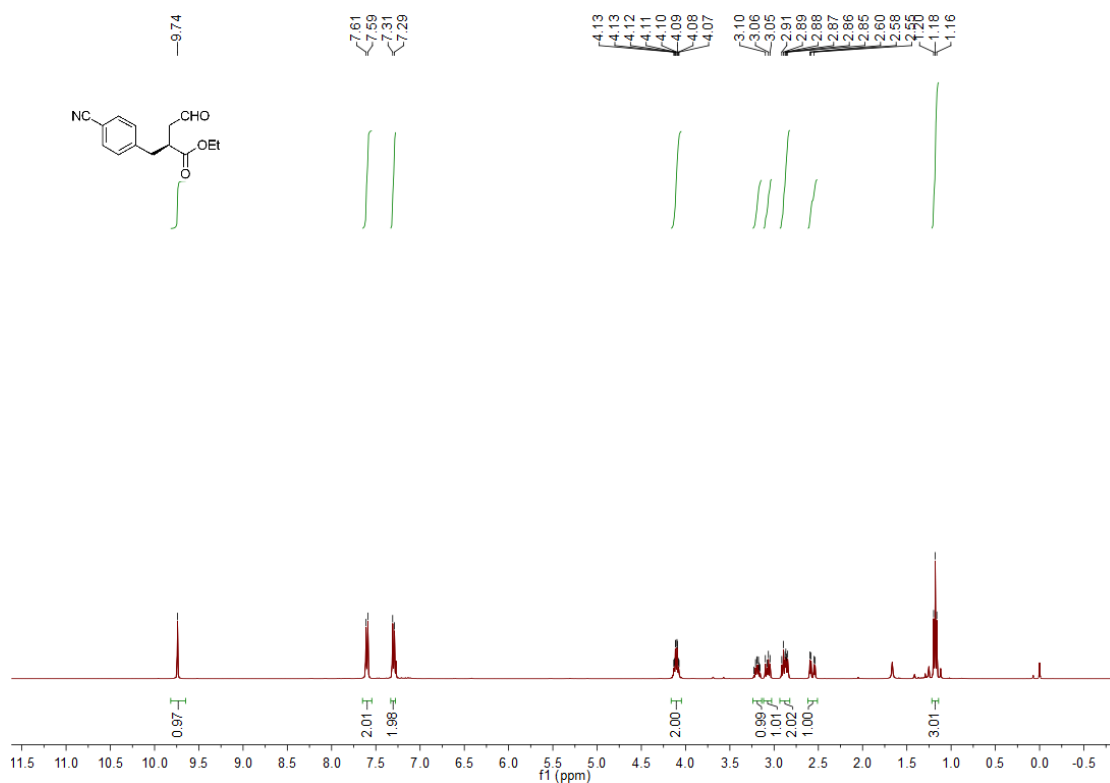


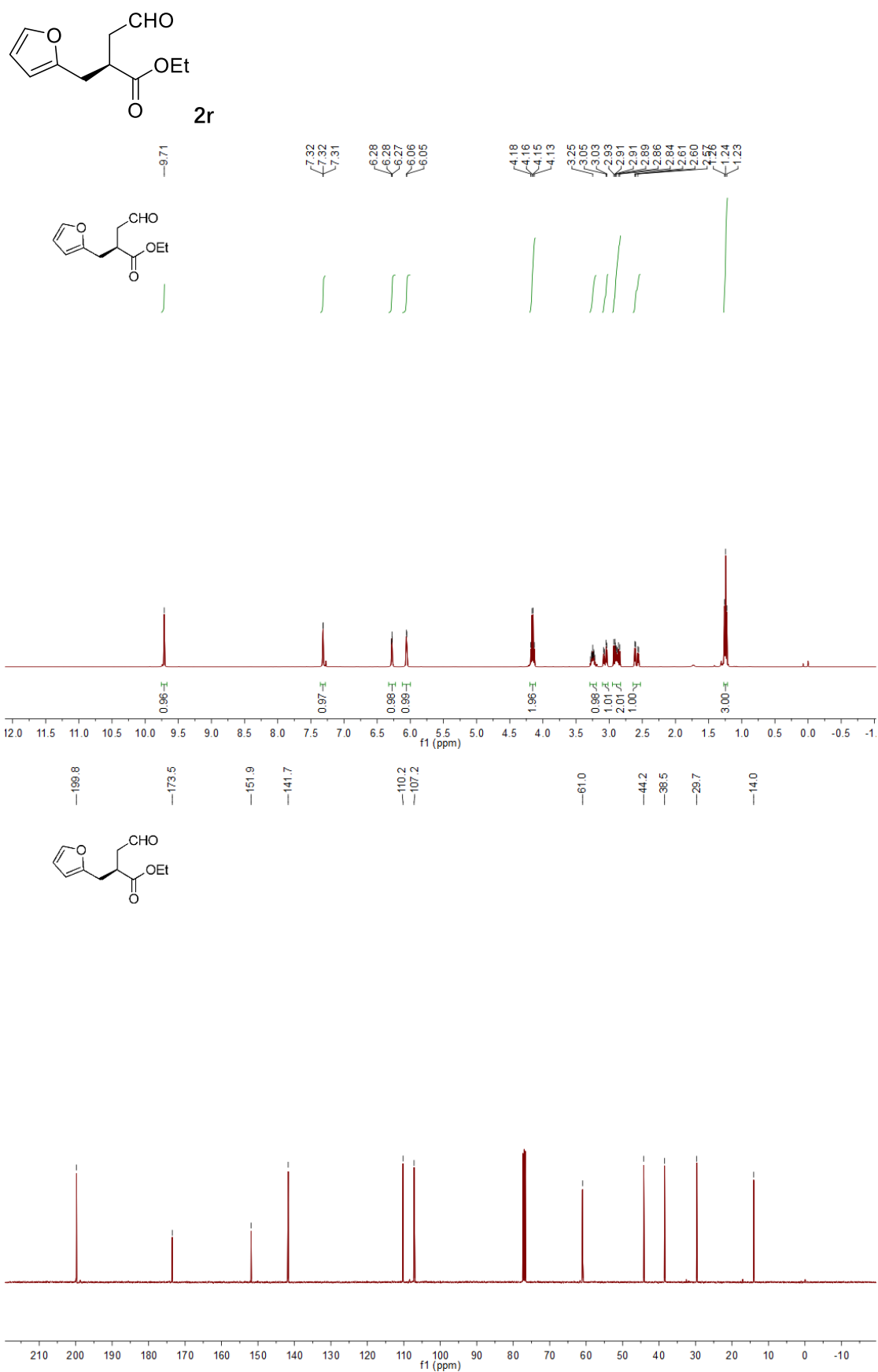


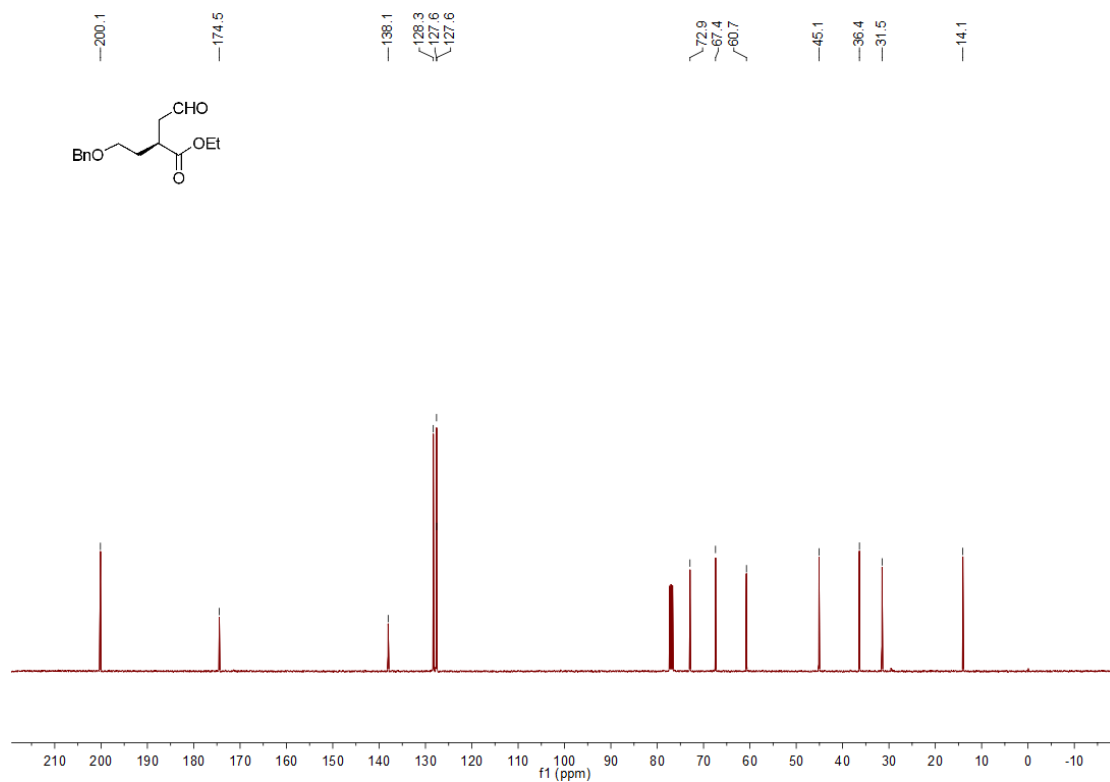
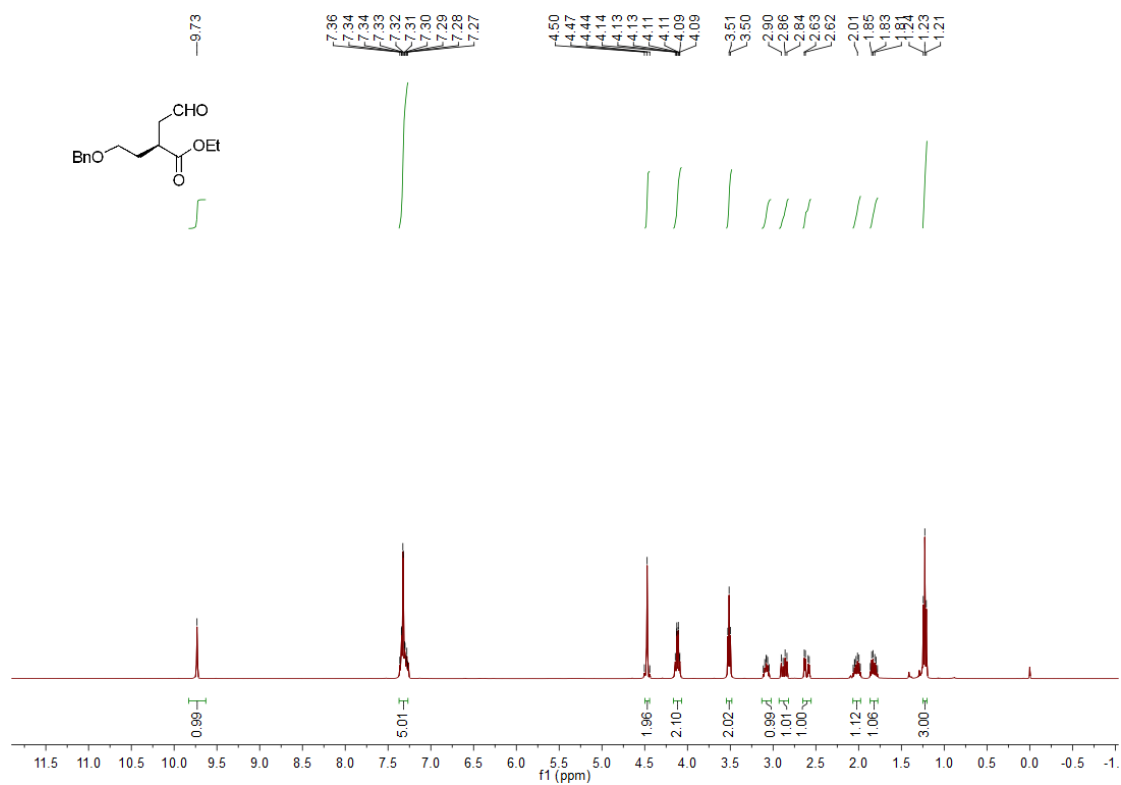
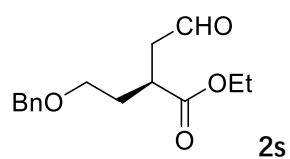


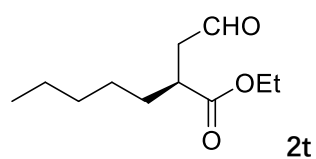


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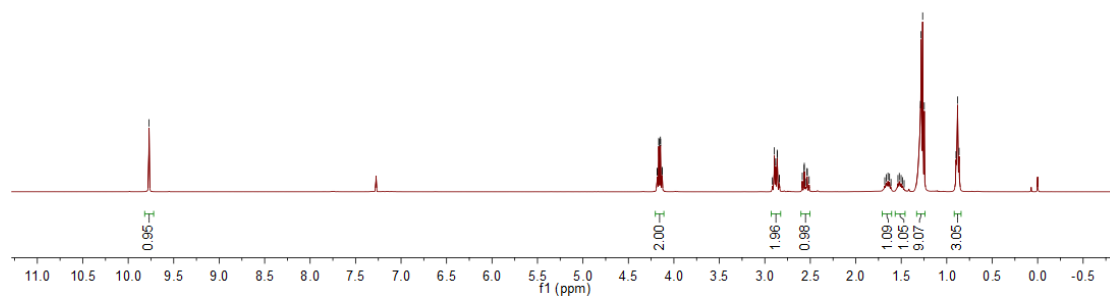
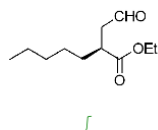






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4.16  
4.15  
4.15  
4.13  
4.13  
2.90  
2.88  
2.86  
2.86  
2.57  
2.54  
2.53  
1.65  
1.29  
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1.25  
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0.86



200.5

174.9

60.7

45.4

39.0

31.9

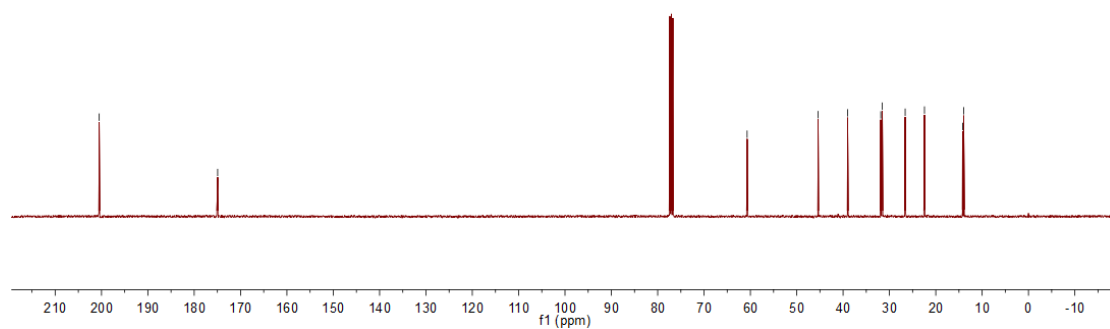
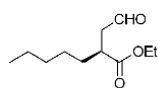
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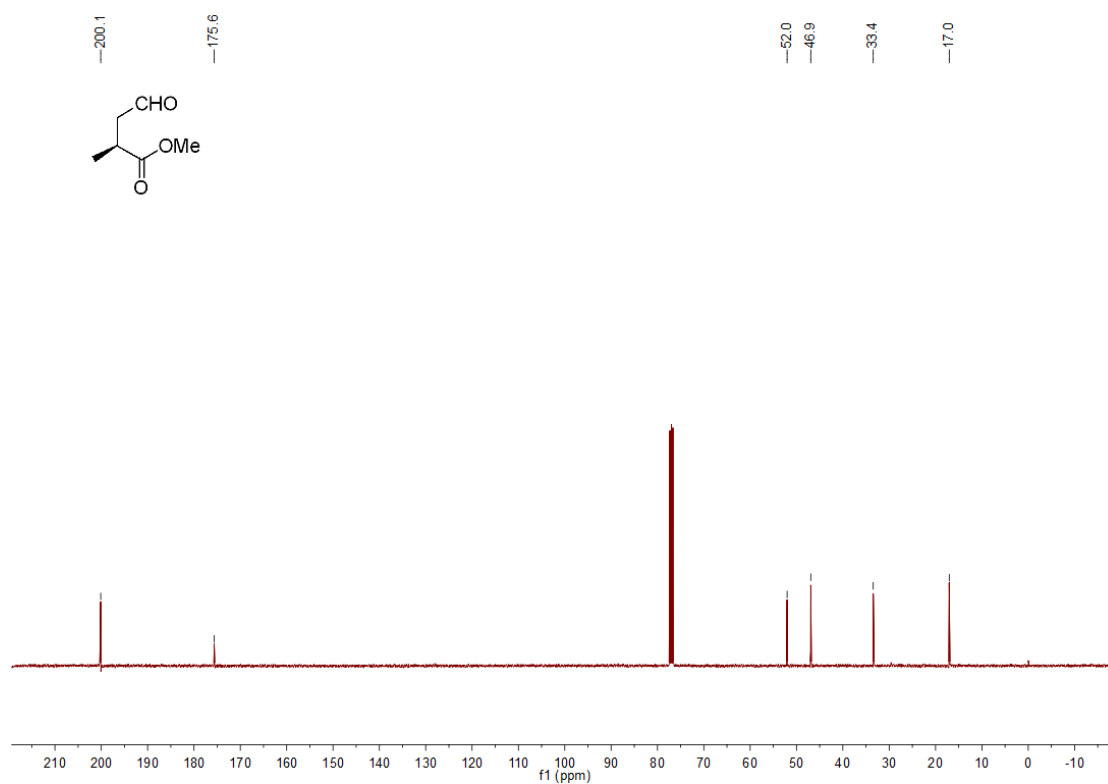
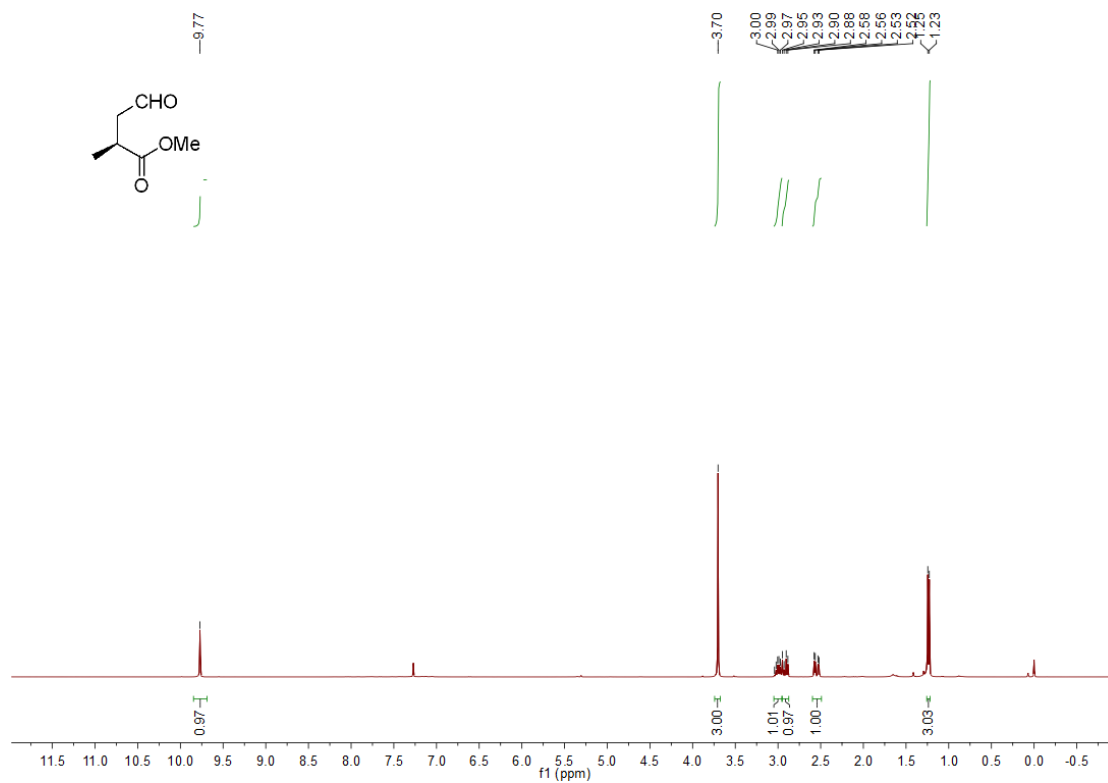
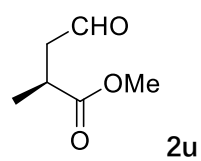
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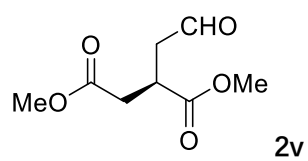
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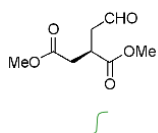
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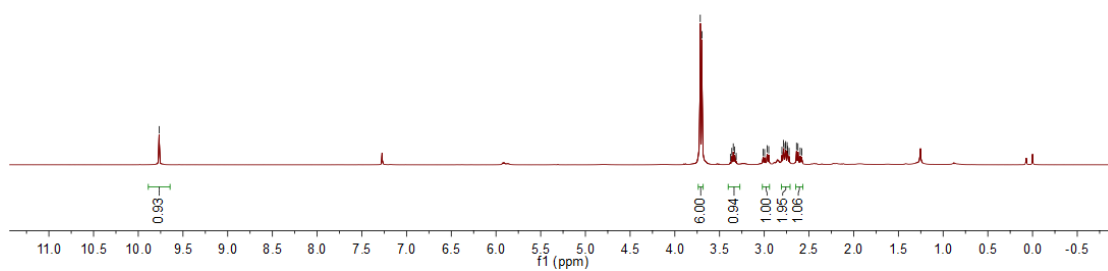




9.77



3.72  
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3.38  
3.36  
3.35  
3.33  
3.31  
3.01  
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2.95  
2.80  
2.78  
2.77  
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2.62  
2.60  
2.58



199.3

173.6  
171.8

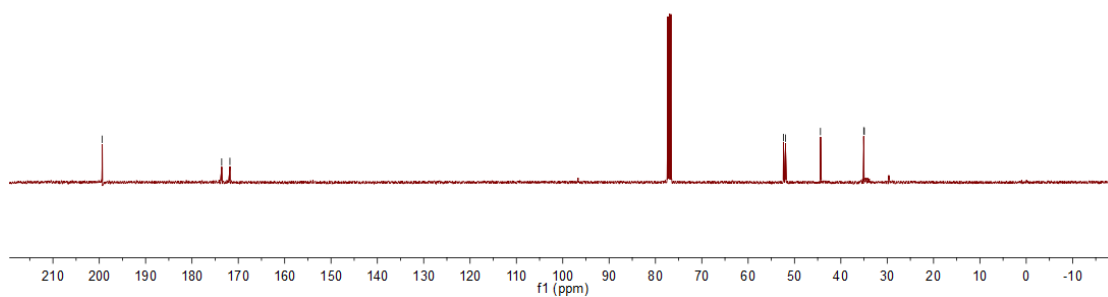
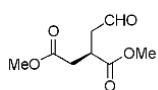
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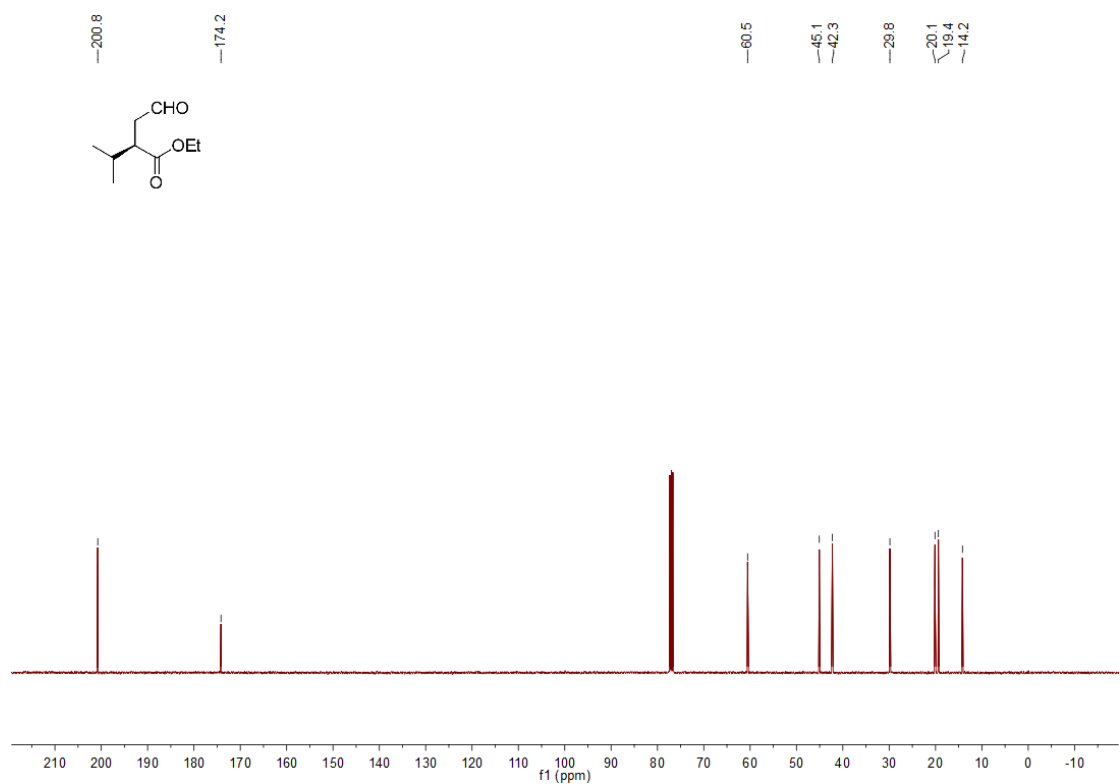
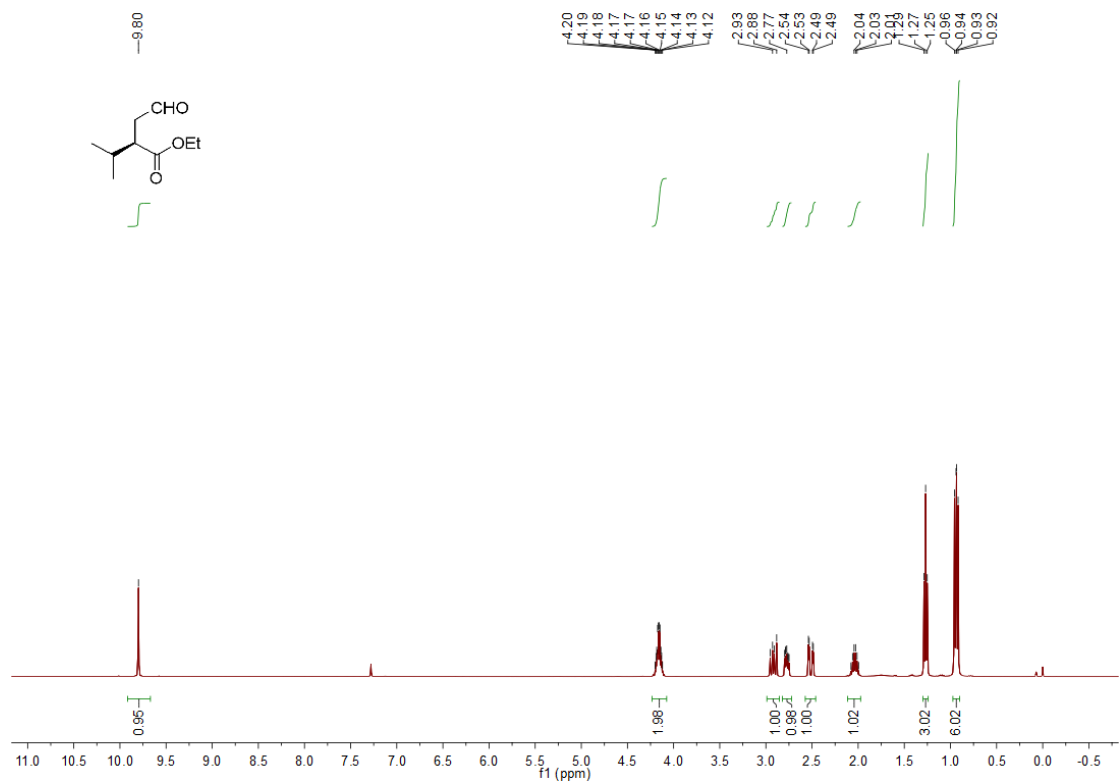
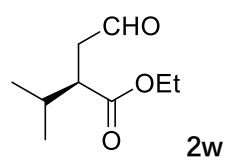
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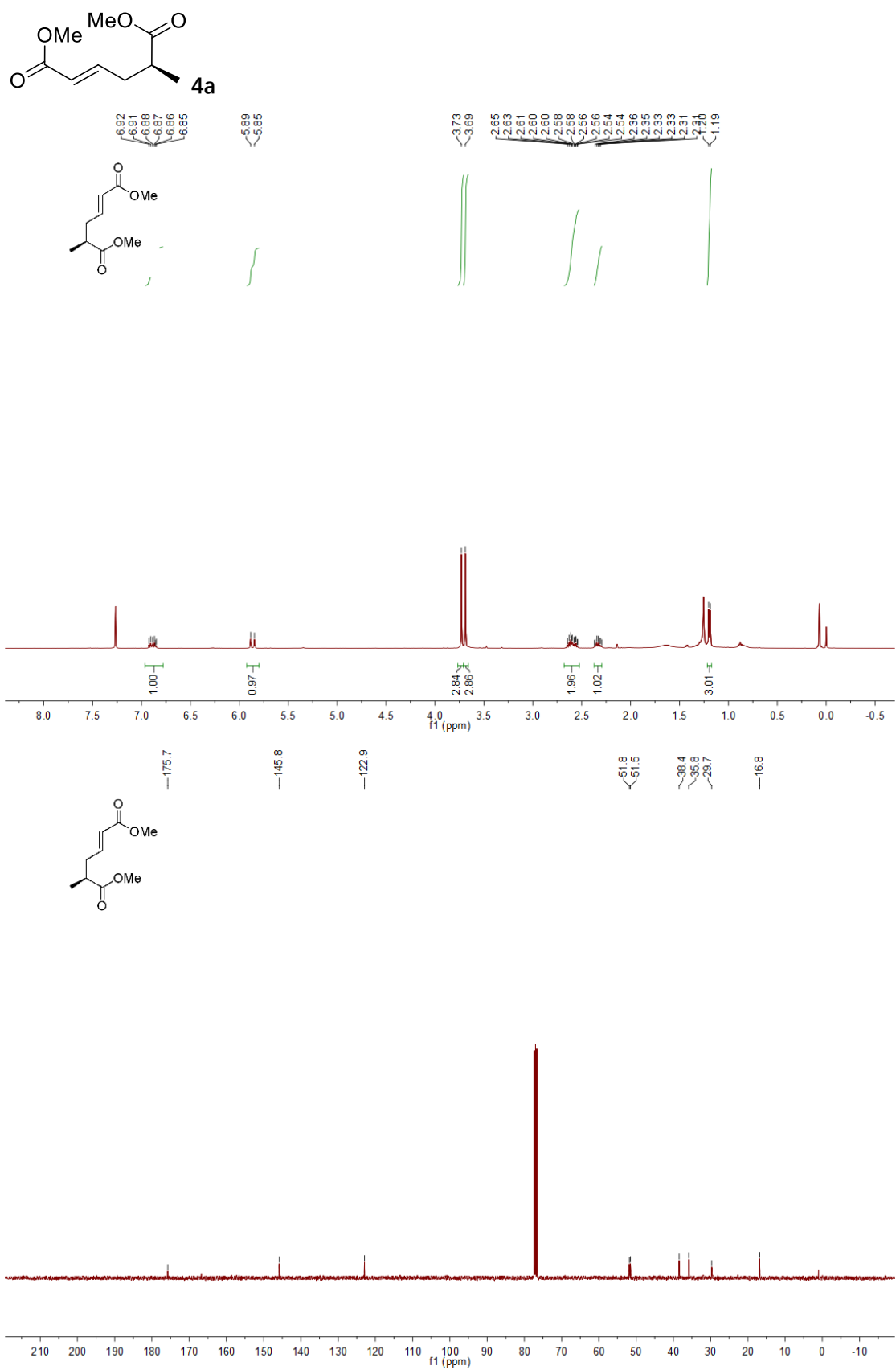
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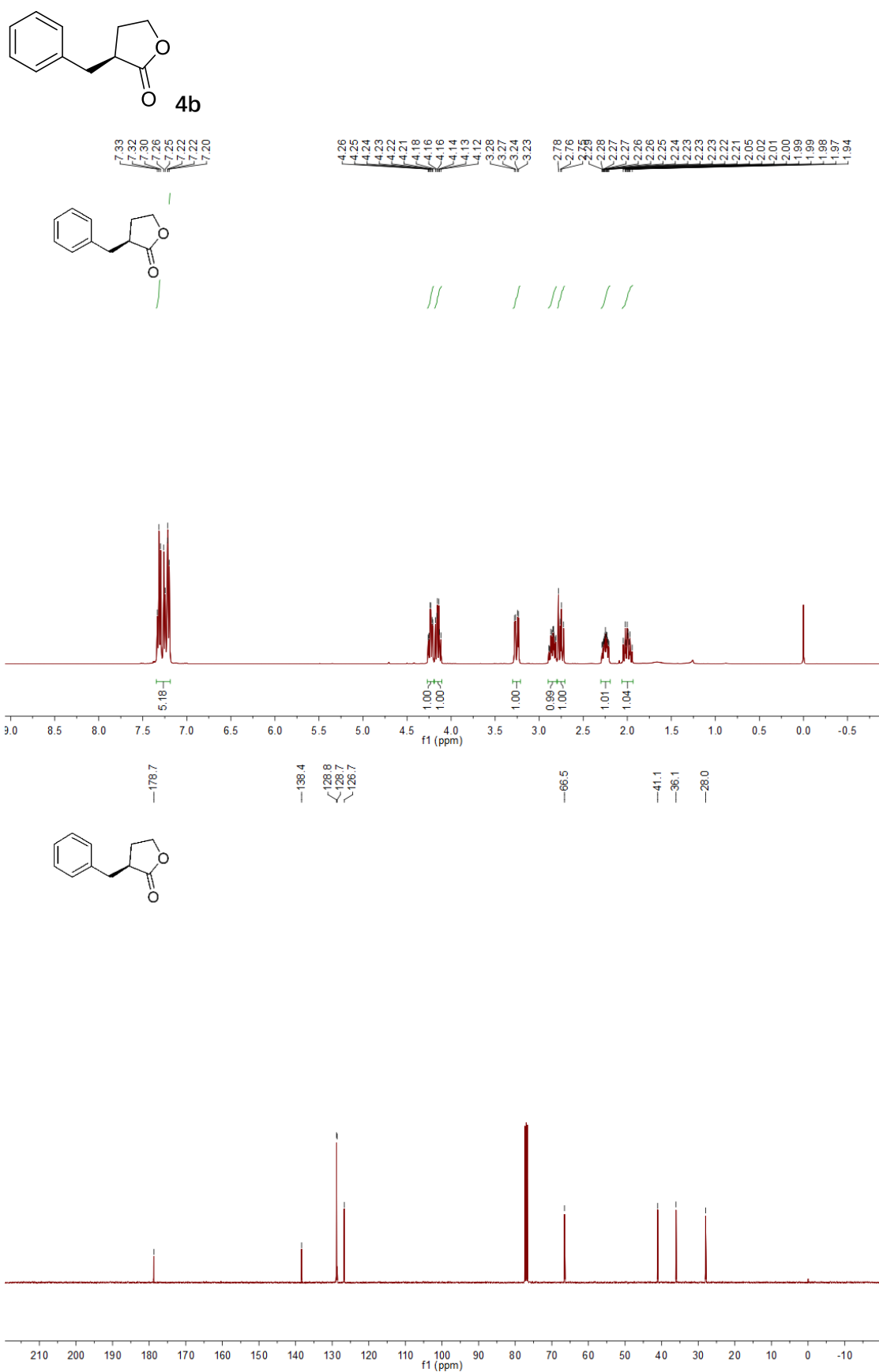
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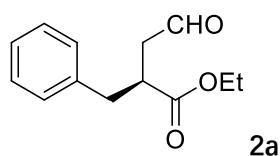








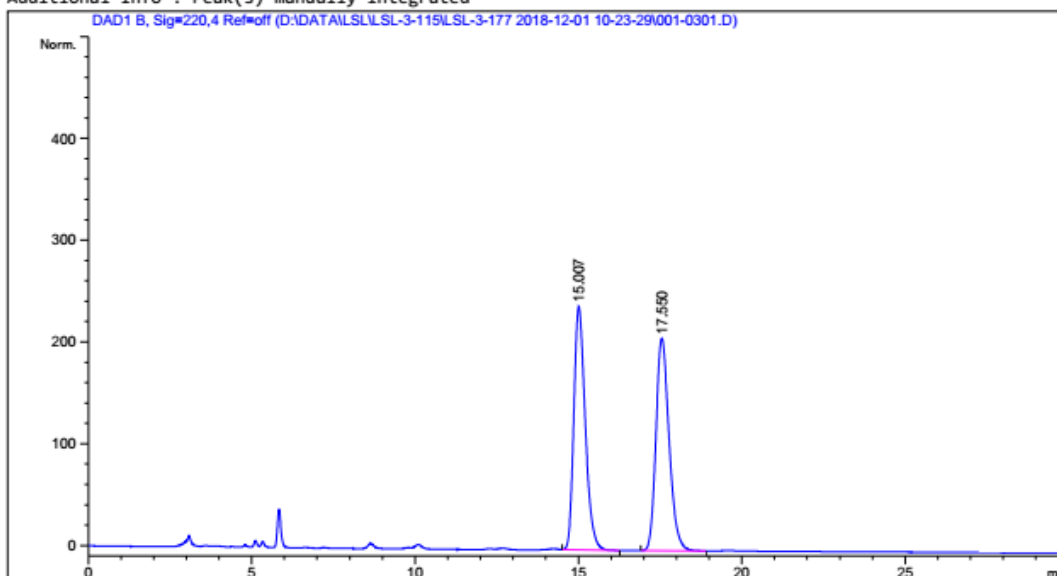
## 8. HPLC spectra



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Sample Name: OET RAC

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### Area Percent Report

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Dilution       :      1.0000
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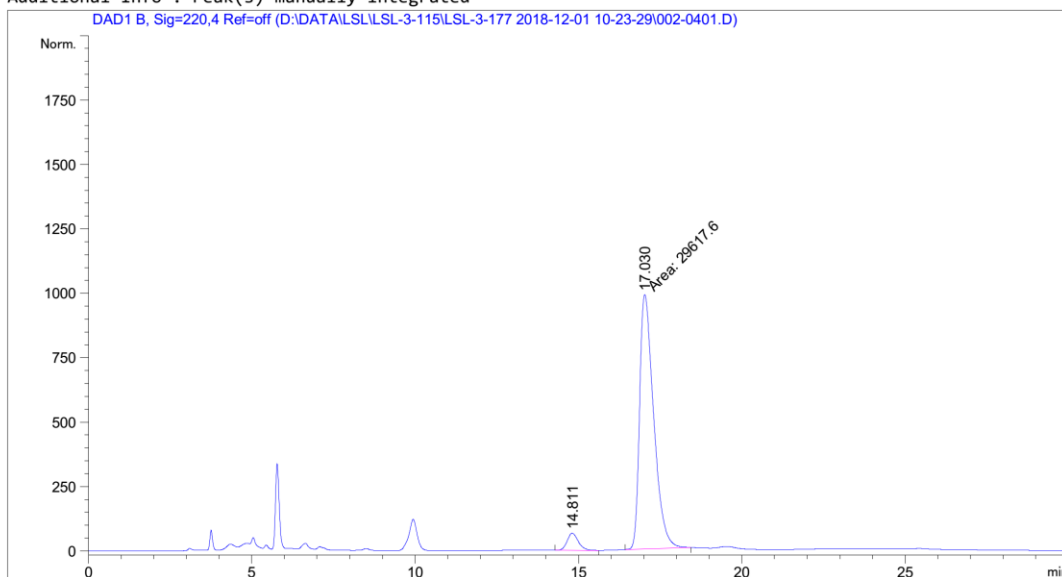
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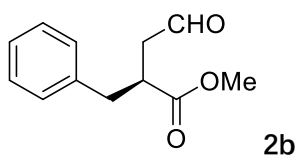
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2	17.030	MM	0.4993	2.96176e4	988.58087	95.0002

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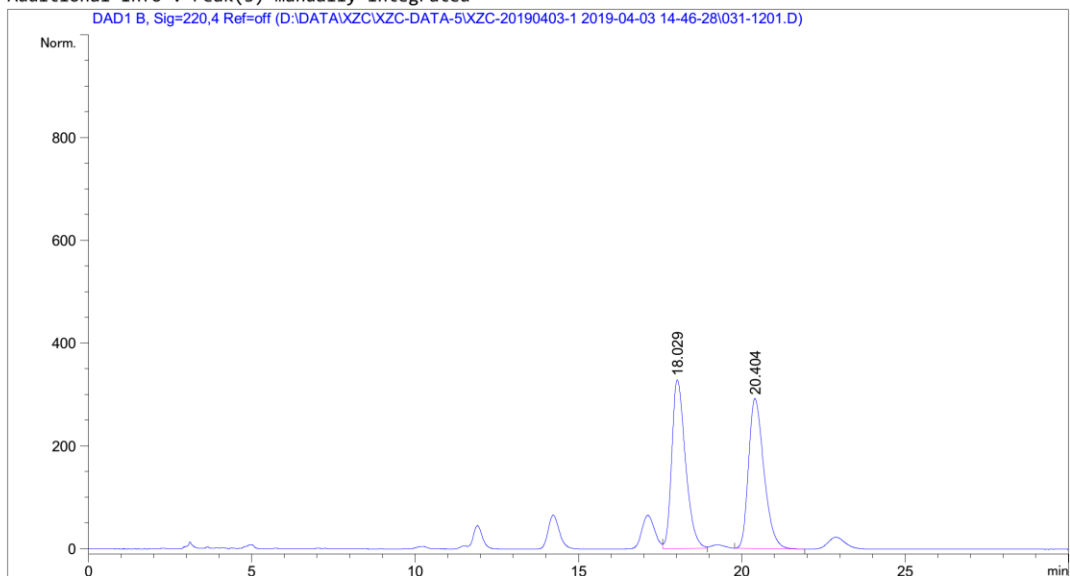


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# Area Percent Report

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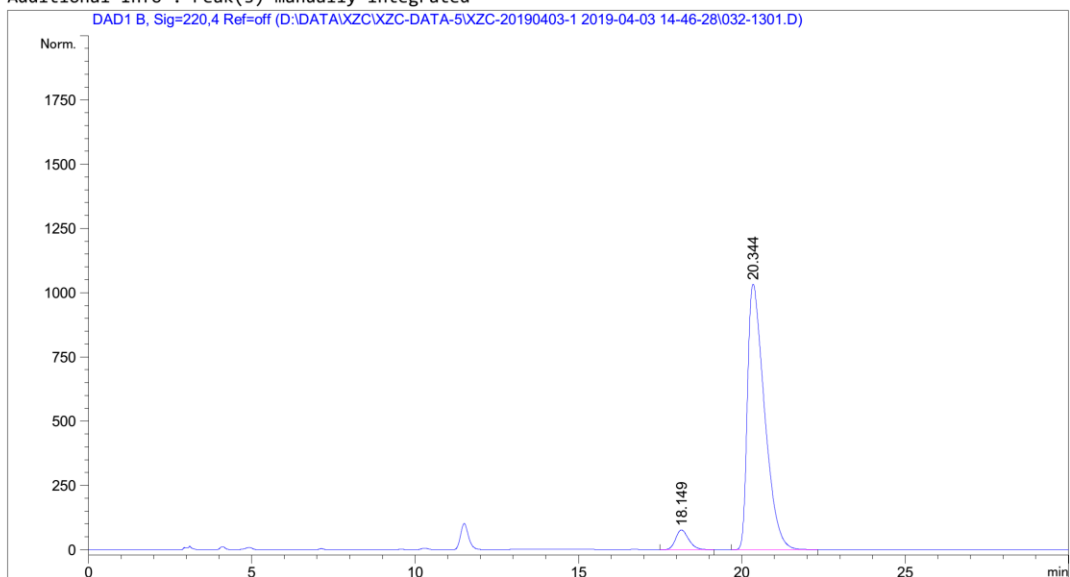
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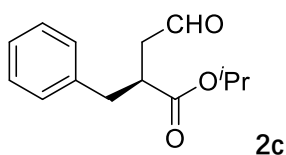
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Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
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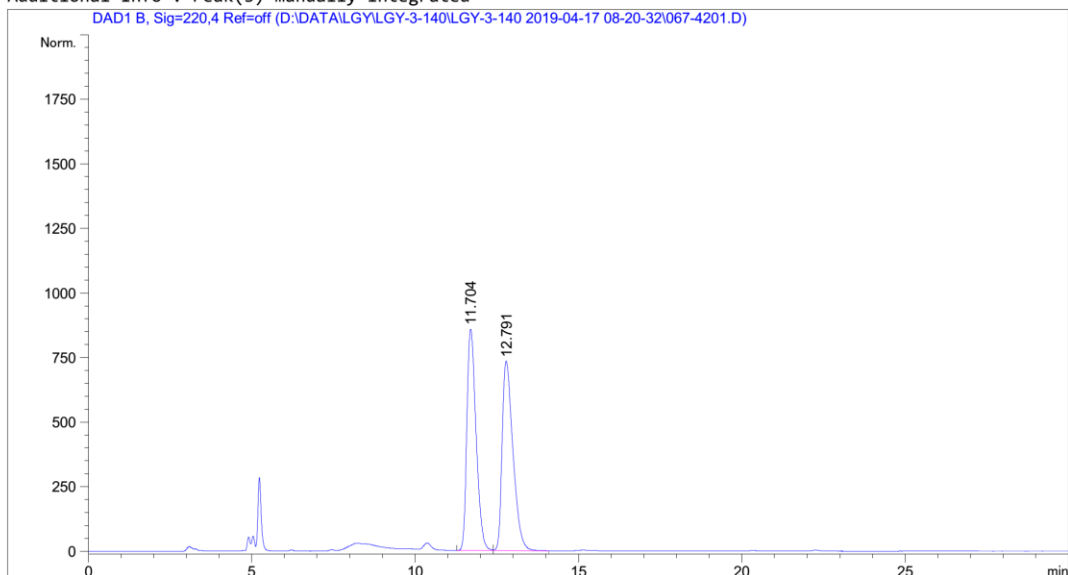


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Additional Info : Peak(s) manually integrated
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Area Percent Report  
=====

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

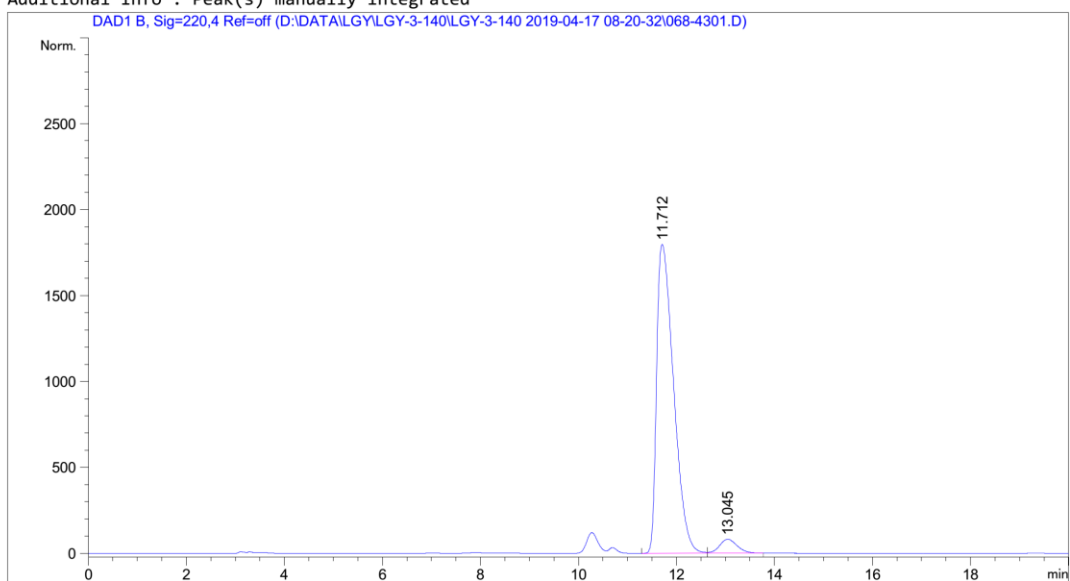
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.704	BV	0.3019	1.67489e4	857.38049	49.8013
2	12.791	VB	0.3484	1.68825e4	733.88715	50.1987

Totals :                      3.36314e4   1591.26764

Data File D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\068-4301.D  
Sample Name: LSL-iPr

```
=====
Acq. Operator   :                               Seq. Line :   43
Acq. Instrument : Instrument 2                   Location  : Vial 68
Injection Date  : 4/18/2019 5:35:47 AM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\DAD-OJ(1-6)-98-2-1ML-
3UL-ALL-60MIN.M
Last changed    : 9/28/2018 8:55:24 AM
Analysis Method : D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\DAD-OJ(1-6)-98-2-1ML-
3UL-ALL-60MIN.M (Sequence Method)
Last changed    : 4/18/2019 9:29:19 AM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



Area Percent Report

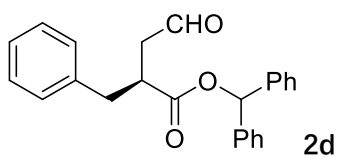
```
Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.712	BV	0.3316	4.30721e4	1797.50635	95.4981
2	13.045	VB	0.3775	2030.46753	81.25902	4.5019

Totals : 4.51026e4 1878.76537





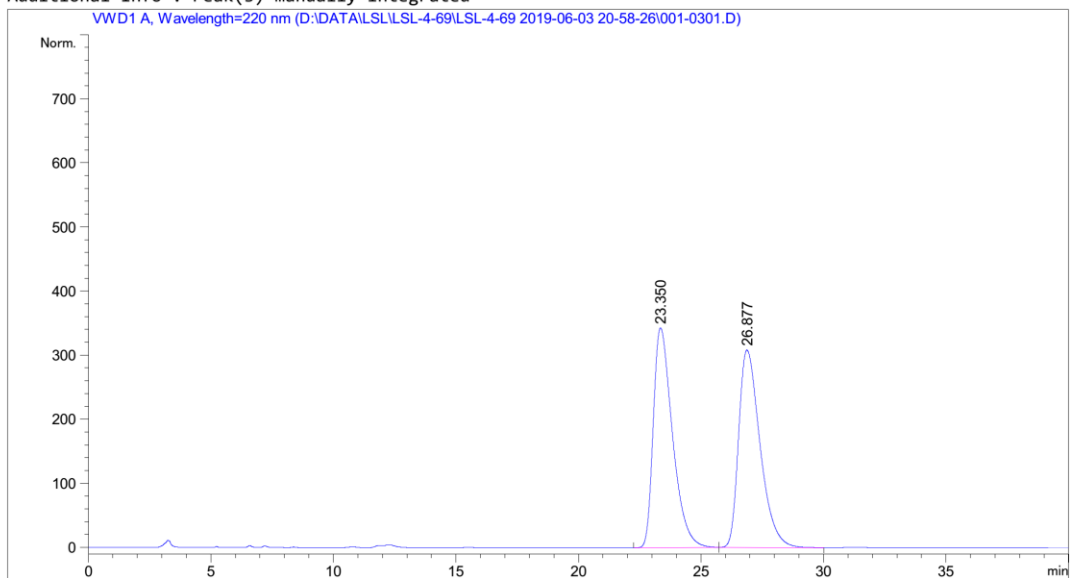
Data File D:\DATA\LSL\LSL-4-69\LSL-4-69 2019-06-03 20-58-26\001-0301.D

Sample Name: LSL-4-69-RAC

```

=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 1                  Location  : Vial 1
Injection Date  : 6/3/2019 9:21:08 PM           Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-69\LSL-4-69 2019-06-03 20-58-26\VWD-OD(1-2)-98-2-1ML-5UL-
                  220NM-40MIN.M
Last changed    : 6/3/2019 8:56:27 PM
Analysis Method : D:\METHOD\LSL\VWD-OD(1-2)-98-2-1ML-5UL-220NM-40MIN.M
Last changed    : 6/4/2019 8:43:57 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
  
```



#### Area Percent Report

```

=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

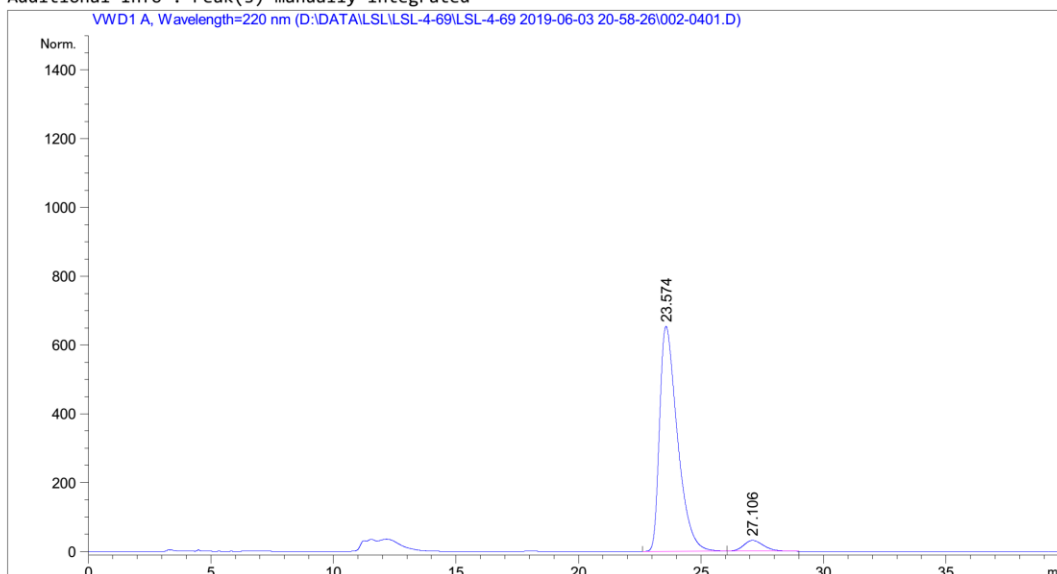
Signal 1: VWD1 A, Wavelength=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	23.350	BB	0.8327	1.86351e4	343.05798	49.9112
2	26.877	BB	0.9316	1.87014e4	307.89487	50.0888

Totals :                      3.73364e4    650.95285

Data File D:\DATA\LSL\LSL-4-69\LSL-4-69 2019-06-03 20-58-26\002-0401.D  
Sample Name: LSL-4-69

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 1                   Location  : Vial 2
Injection Date  : 6/3/2019 10:01:58 PM           Inj       :    1
                                                Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LSL\LSL-4-69\LSL-4-69 2019-06-03 20-58-26\VWD-OD(1-2)-98-2-1ML-5UL-
                  220NM-40MIN.M
Last changed    : 6/3/2019 8:56:27 PM
Analysis Method : D:\METHOD\LSL\VWD-OD(1-2)-98-2-1ML-5UL-220NM-40MIN.M
Last changed    : 6/4/2019 8:45:14 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



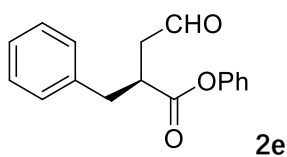
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	23.574	BB	0.7639	3.29479e4	653.87494	94.9983
2	27.106	BB	0.8551	1734.73364	31.12970	5.0017

Totals : 3.46826e4 685.00464



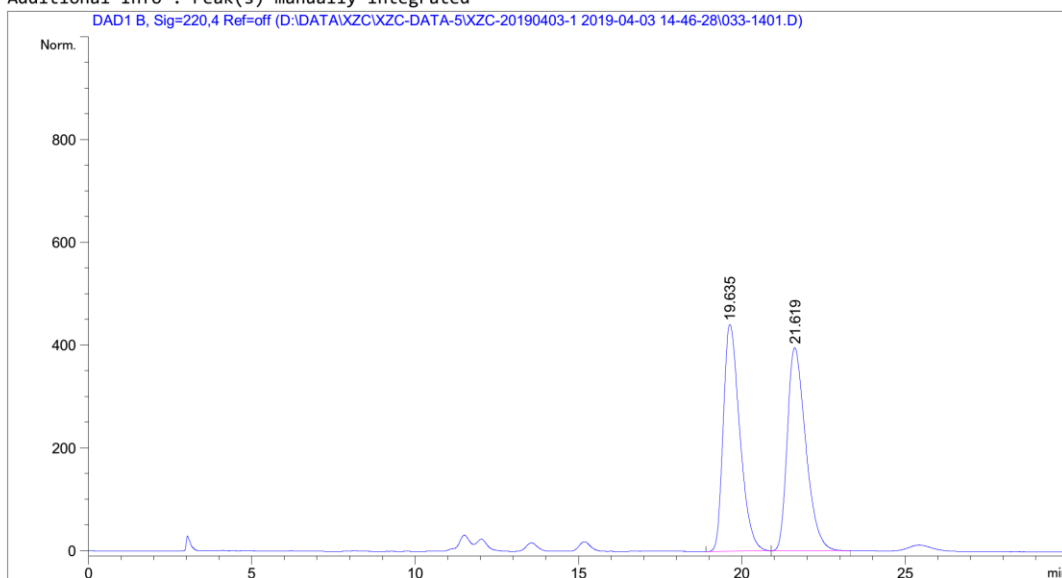
Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\033-1401.D

Sample Name: LSL-OPH RAC

```

=====
Acq. Operator   :                               Seq. Line :   14
Acq. Instrument : Instrument 2                  Location  : Vial 33
Injection Date  : 4/4/2019 2:11:04 AM          Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\DAD-OD(1-2)-98-2-
                  1ML-5UL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OD(1-2)-96-4-0.5ML-5UL-ALL-120MIN.M
Last changed    : 4/4/2019 8:59:30 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
  
```



# Area Percent Report

```

Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

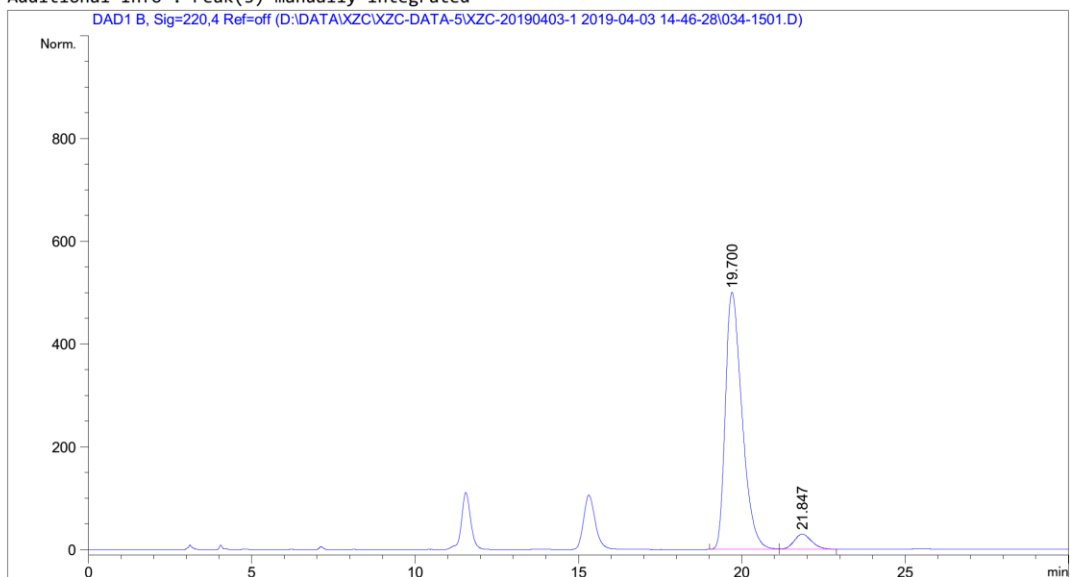
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.635	BB	0.5400	1.55139e4	441.40121	49.9944
2	21.619	BB	0.5984	1.55174e4	394.91980	50.0056

Totals :                      3.10313e4    836.32101

Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\034-1501.D  
Sample Name: LSL-OPH

```
=====
Acq. Operator   :                               Seq. Line :   15
Acq. Instrument : Instrument 2                  Location  : Vial 34
Injection Date  : 4/4/2019 2:52:05 AM           Inj       :    1
                                           Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\DAD-OD(1-2)-98-2-
                  1ML-SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OD(1-2)-96-4-0.5ML-SUL-ALL-120MIN.M
Last changed    : 4/4/2019 8:59:30 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



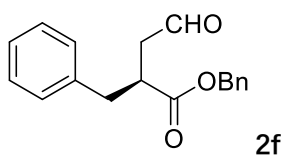
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.700	BV	0.5455	1.77180e4	499.95978	94.1148
2	21.847	VB	0.5168	1107.94885	29.45843	5.8852

Totals :                      1.88259e4    529.41820

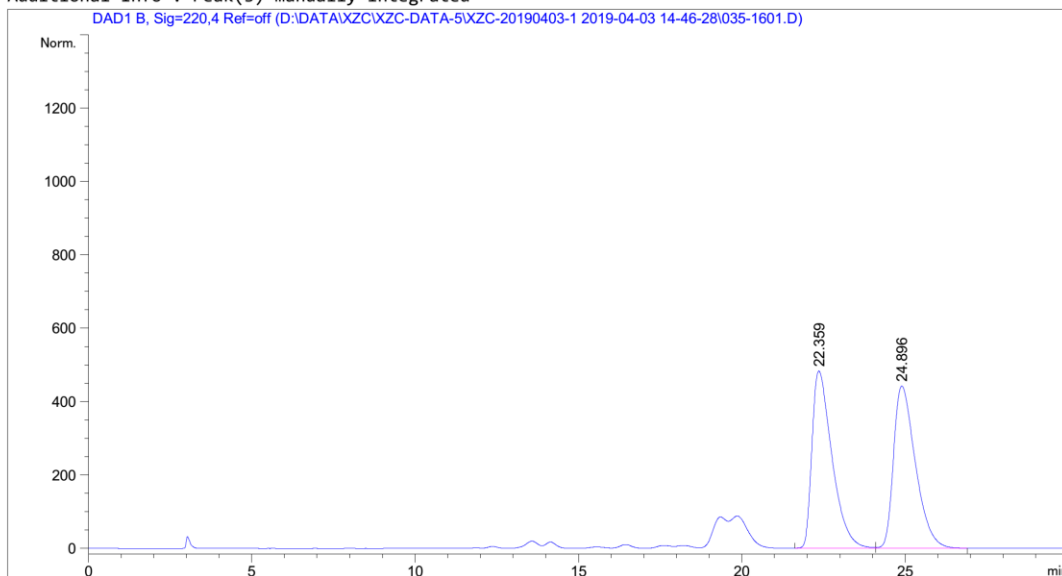


Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\035-1601.D

Sample Name: LSL-OBN RAC

```
=====
Acq. Operator   :                               Seq. Line :   16
Acq. Instrument : Instrument 2                   Location  : Vial 35
Injection Date  : 4/4/2019 3:33:05 AM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\DAD-OD(1-2)-98-2-
                  1ML-5UL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OD(1-2)-96-4-0.5ML-5UL-ALL-120MIN.M
Last changed    : 4/4/2019 9:03:32 AM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

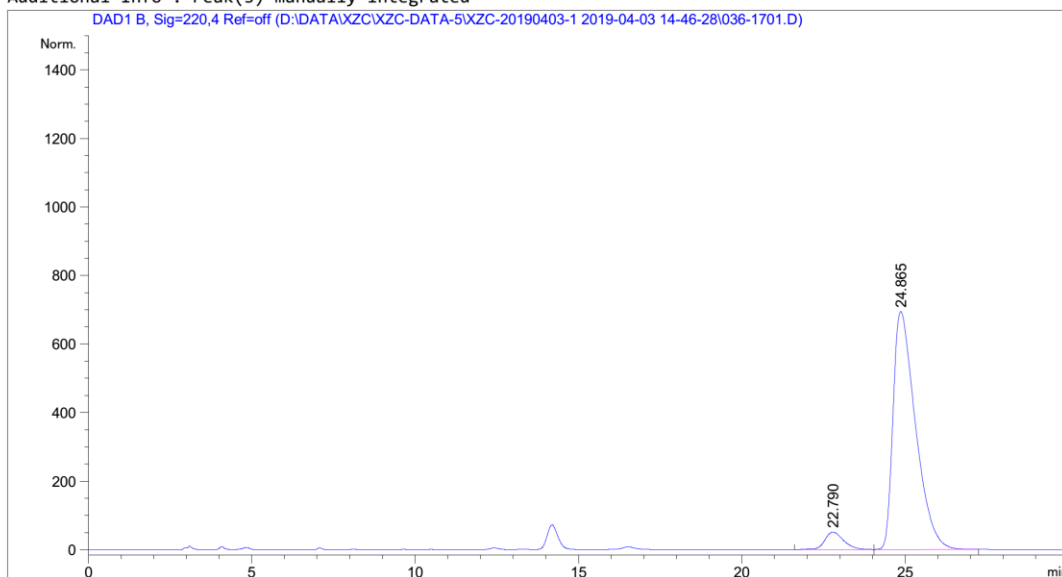
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.359	BV	0.6387	2.05395e4	482.44583	50.0099
2	24.896	VB	0.6936	2.05314e4	442.30383	49.9901

Totals : 4.10709e4 924.74966

Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\036-1701.D  
Sample Name: LSL-OBN

```
=====
Acq. Operator   :                               Seq. Line :   17
Acq. Instrument : Instrument 2                   Location  : Vial 36
Injection Date  : 4/4/2019 4:14:07 AM             Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190403-1 2019-04-03 14-46-28\DAD-OD(1-2)-98-2-
                  1ML-SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OD(1-2)-96-4-0.5ML-SUL-ALL-120MIN.M
Last changed    : 4/4/2019 9:04:57 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



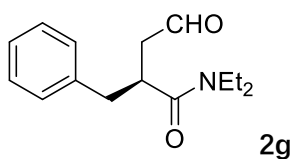
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.790	BB	0.5667	2054.15601	51.13189	5.8400
2	24.865	BB	0.6944	3.31199e4	694.43408	94.1600

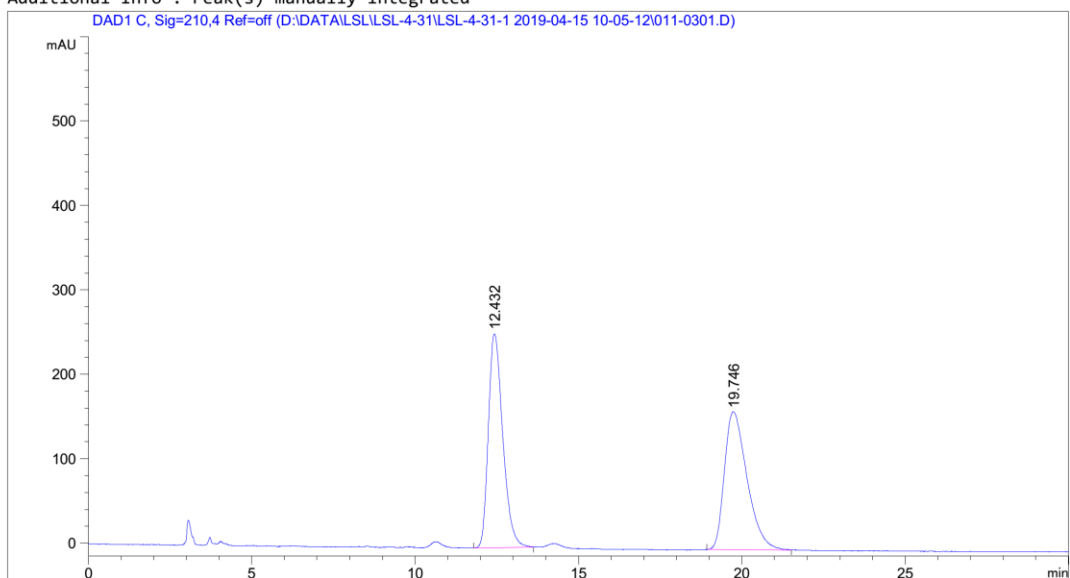
Totals : 3.51741e4 745.56597



Data File D:\DATA\LSL\LSL-4-31\LSL-4-31-1 2019-04-15 10-05-12\011-0301.D  
 Sample Name: LSL-4-21-1

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 11
Injection Date  : 4/15/2019 10:30:20 AM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-31\LSL-4-31-1 2019-04-15 10-05-12\
SUL-ALL-30MIN.M
Last changed    : 4/15/2019 10:17:23 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-80-20-1ML-5UL-ALL-60MIN.M
Last changed    : 9/8/2019 10:54:01 AM
                (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



# Area Percent Report

```
=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
```

Signal 1: DAD1 C, Sig=210,4 Ref=off

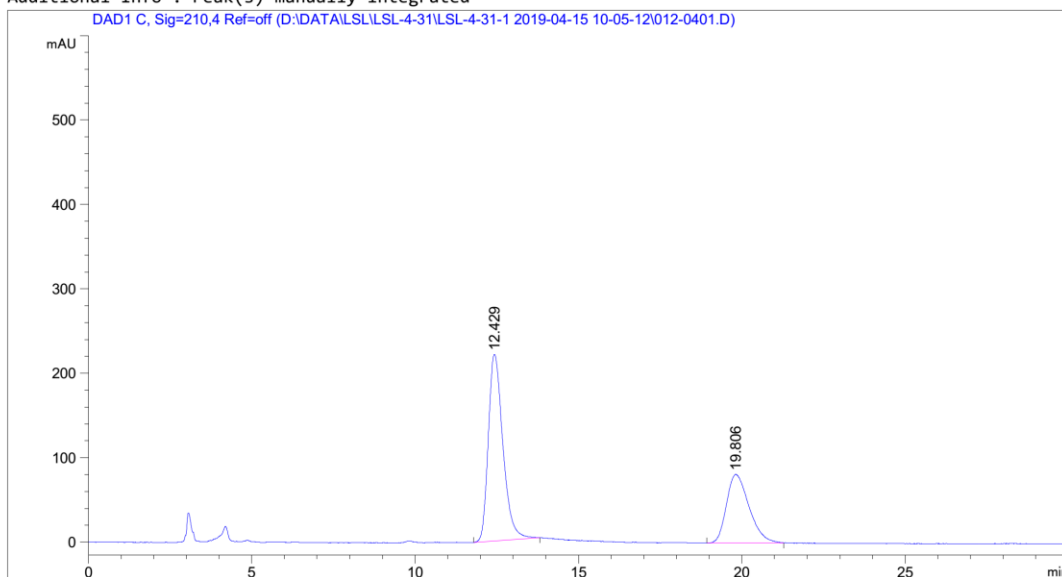
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.432	BV	0.4519	7775.30762	253.46440	49.7057
2	19.746	BV	0.6475	7867.37207	163.46220	50.2943

Totals : 1.56427e4 416.92661

Data File D:\DATA\LSL\LSL-4-31\LSL-4-31-1 2019-04-15 10-05-12\012-0401.D  
Sample Name: LSL-4-31-1

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 12
Injection Date  : 4/15/2019 11:01:19 AM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-31\LSL-4-31-1 2019-04-15 10-05-12\DAD-OD(1-2)-95-5-1ML-
                    SUL-ALL-30MIN.M
Last changed    : 4/15/2019 10:17:23 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-80-20-1ML-5UL-ALL-60MIN.M
Last changed    : 9/8/2019 10:52:16 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

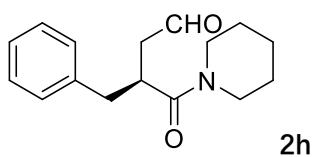
```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 C, Sig=210,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.429	BB	0.4564	6871.85010	221.21272	63.8419
2	19.806	BV	0.5887	3892.00366	81.26534	36.1581

Totals : 1.07639e4 302.47806



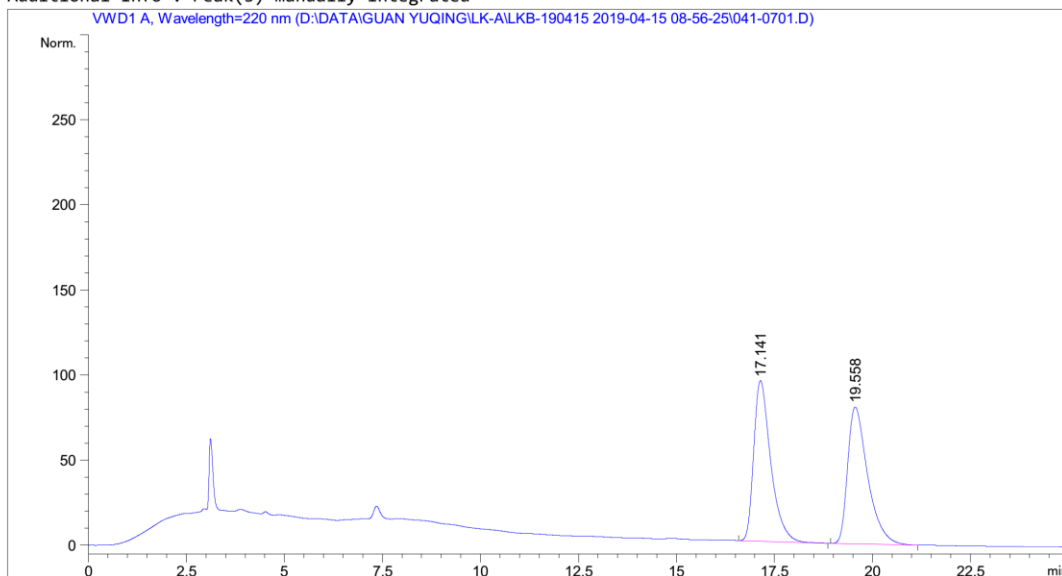


Data File D:\DATA\GUAN YUQING\LK-A\LKB-190415 2019-04-15 08-56-25\041-0701.D

Sample Name: LSL-4-21-3

```
=====
Acq. Operator   :                               Seq. Line :    7
Acq. Instrument : Instrument 1                  Location  : Vial 41
Injection Date  : 4/15/2019 1:01:13 PM          Inj       :    1
                                                Inj Volume : 3.000 µl

Acq. Method     : D:\DATA\GUAN YUQING\LK-A\LKB-190415 2019-04-15 08-56-25\VWD-AD(1-2)-95-5-
                  1ML-3UL-220NM-40MIN.M
Last changed    : 6/7/2018 11:25:33 AM
Analysis Method : D:\METHOD\LG\VWD-AD(1-2)-80-20-1ML-3UL-210NM-60MIN.M
Last changed    : 8/13/2019 5:09:43 PM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

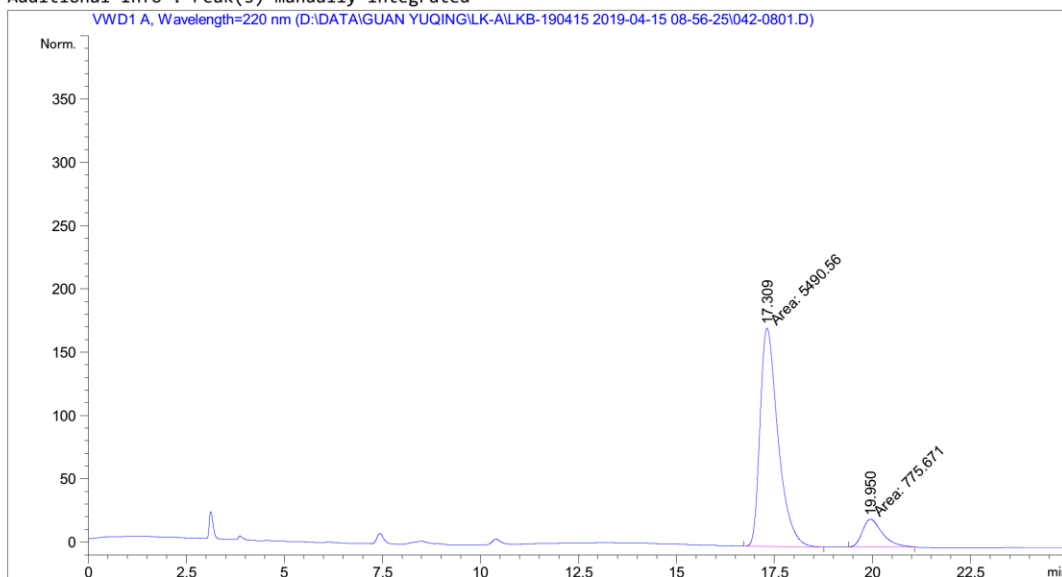
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	17.141	BB	0.4541	2838.71191	94.31995	49.8352
2	19.558	BB	0.5361	2857.48901	80.50407	50.1648

Totals : 5696.20093 174.82403

Data File D:\DATA\GUAN YUQING\LK-A\LKB-190415 2019-04-15 08-56-25\042-0801.D  
Sample Name: LSL-4-31-2

```
=====
Acq. Operator   :                               Seq. Line :    8
Acq. Instrument : Instrument 1                   Location  : Vial 42
Injection Date  : 4/15/2019 1:42:02 PM           Inj       :    1
                                                Inj Volume: 3.000 µl

Acq. Method     : D:\DATA\GUAN YUQING\LK-A\LKB-190415 2019-04-15 08-56-25\VWD-AD(1-2)-95-5-
                  1ML-3UL-220NM-40MIN.M
Last changed    : 6/7/2018 11:25:33 AM
Analysis Method : D:\METHOD\LG\VWD-AD(1-2)-80-20-1ML-3UL-210NM-60MIN.M
Last changed    : 8/13/2019 5:06:55 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



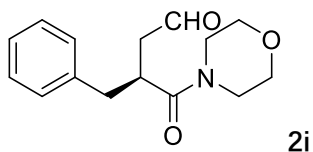
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: VWD1 A, Wavelength=220 nm

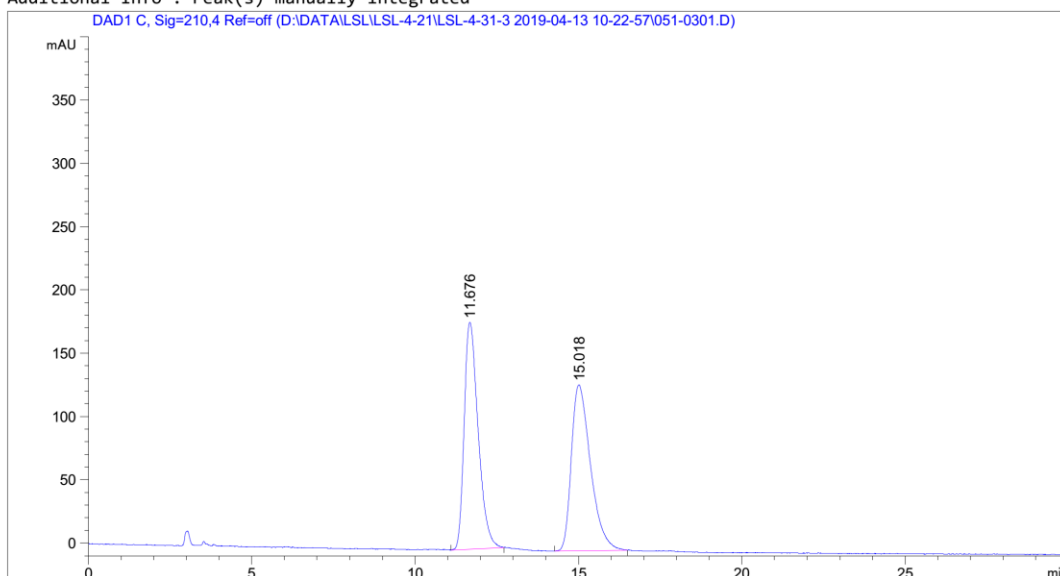
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	17.309	MM	0.5305	5490.56152	172.49892	87.6214
2	19.950	MM	0.5903	775.67078	21.89940	12.3786

Totals :                    6266.23230   194.39832



Data File D:\DATA\LSL\LSL-4-21\LSL-4-31-3 2019-04-13 10-22-57\051-0301.D  
 Sample Name: LSL-4-21-4

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 51
Injection Date  : 4/13/2019 10:47:55 AM          Inj       :    1
                                                Inj Volume : 3.000 µl
Acq. Method     : D:\DATA\LSL\LSL-4-21\LSL-4-31-3 2019-04-13 10-22-57\
DAD-OD(1-2)-90-10-1ML-3UL-ALL-40MIN.M
Last changed    : 11/19/2018 8:48:05 AM
Analysis Method : D:\METHOD\LG\DAD-0J(1-6)-80-20-1ML-5UL-ALL-60MIN.M
Last changed    : 4/15/2019 10:10:51 AM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 C, Sig=210,4 Ref=off

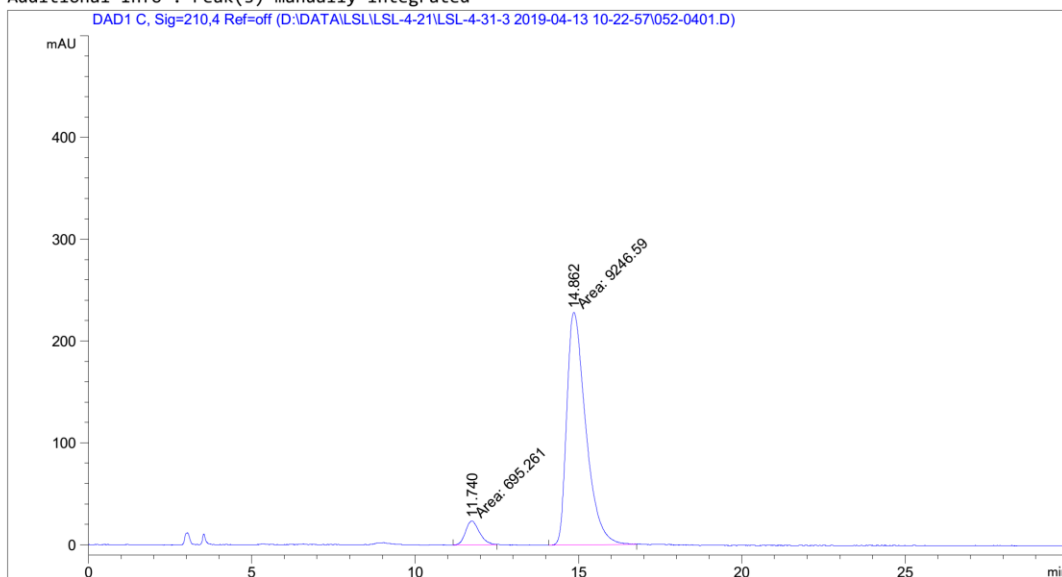
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.676	BV	0.4404	5320.61035	179.19835	49.9389
2	15.018	BB	0.5521	5333.63428	131.23808	50.0611

Totals : 1.06542e4 310.43643

Data File D:\DATA\LSL\LSL-4-21\LSL-4-31-3 2019-04-13 10-22-57\052-0401.D  
Sample Name: LSL-4-31-3

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 52
Injection Date  : 4/13/2019 11:28:52 AM          Inj       :    1
                                                Inj Volume : 3.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-21\LSL-4-31-3 2019-04-13 10-22-57\DAD-OD(1-2)-90-10-1ML-
3UL-ALL-40MIN.M
Last changed    : 11/19/2018 8:48:05 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-6)-80-20-1ML-5UL-ALL-60MIN.M
Last changed    : 4/15/2019 10:13:15 AM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



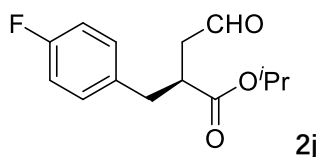
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 C, Sig=210,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.740	MM	0.4948	695.26068	23.41763	6.9933
2	14.862	MM	0.6738	9246.58789	228.70569	93.0067

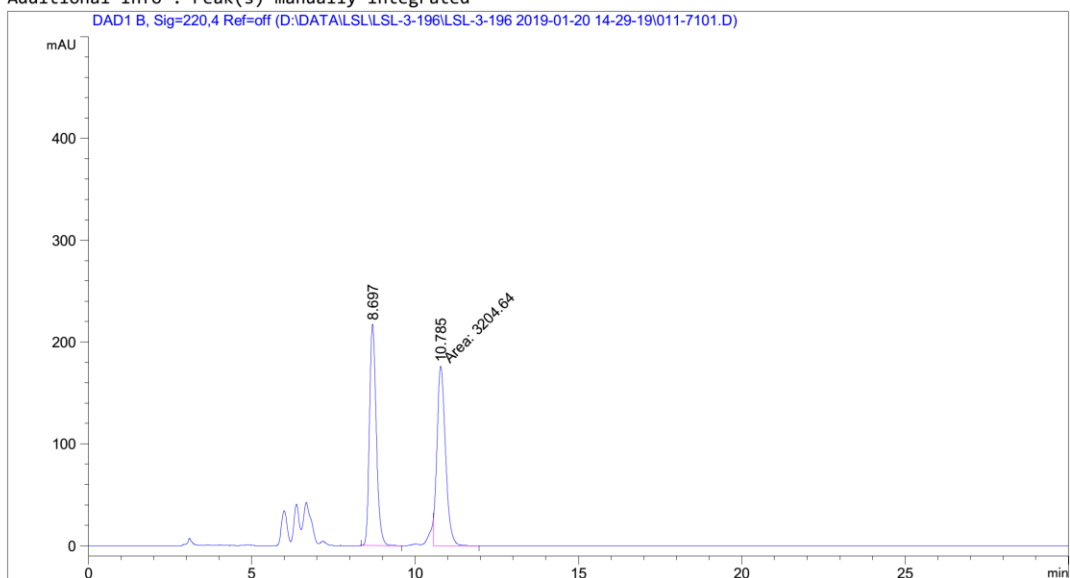
Totals :                    9941.84857   252.12332



Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\011-7101.D  
Sample Name: P-F RAC

```
=====
Acq. Operator   :                               Seq. Line :   71
Acq. Instrument : Instrument 2                  Location  : Vial 11
Injection Date  : 1/22/2019 2:21:00 AM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OJ(1-6)-96-4-0.8ML-SUL-ALL-90MIN.M
Last changed    : 1/22/2019 12:22:17 PM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

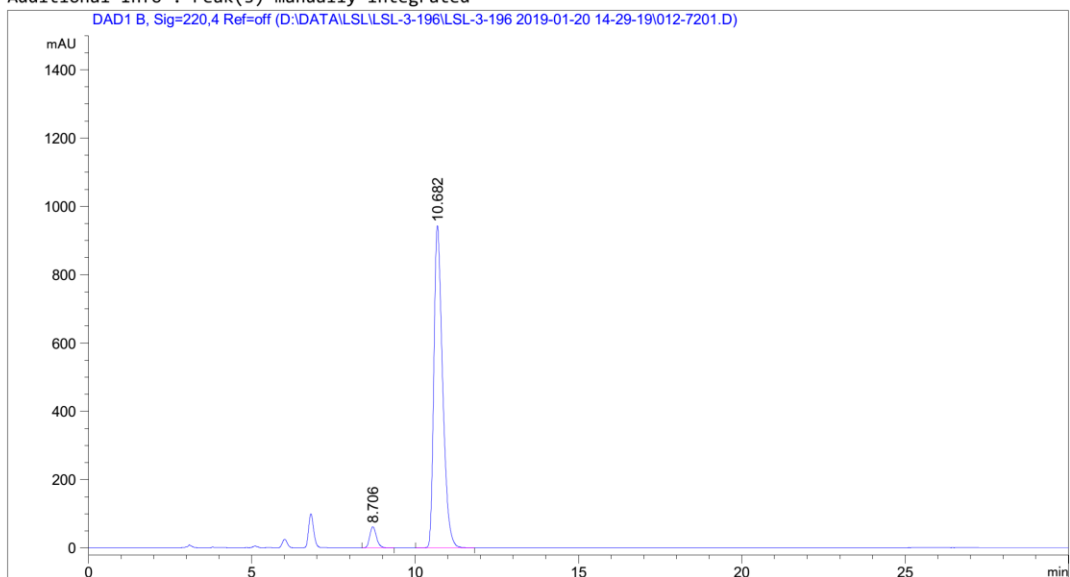
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.697	BB	0.2201	3131.26563	217.34355	49.4209
2	10.785	FM	0.3031	3204.64209	176.21651	50.5791

Totals :                    6335.90771   393.56006

Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\012-7201.D  
Sample Name: P-F

```
=====
Acq. Operator   :                               Seq. Line :   72
Acq. Instrument : Instrument 2                   Location  : Vial 12
Injection Date  : 1/22/2019 3:02:01 AM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OJ(1-6)-96-4-0.8ML-SUL-ALL-90MIN.M
Last changed    : 1/22/2019 12:24:03 PM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
```



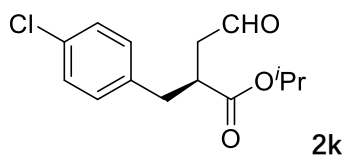
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.706	BB	0.2199	883.87872	62.14118	4.8001
2	10.682	BB	0.2848	1.75298e4	943.52692	95.1999

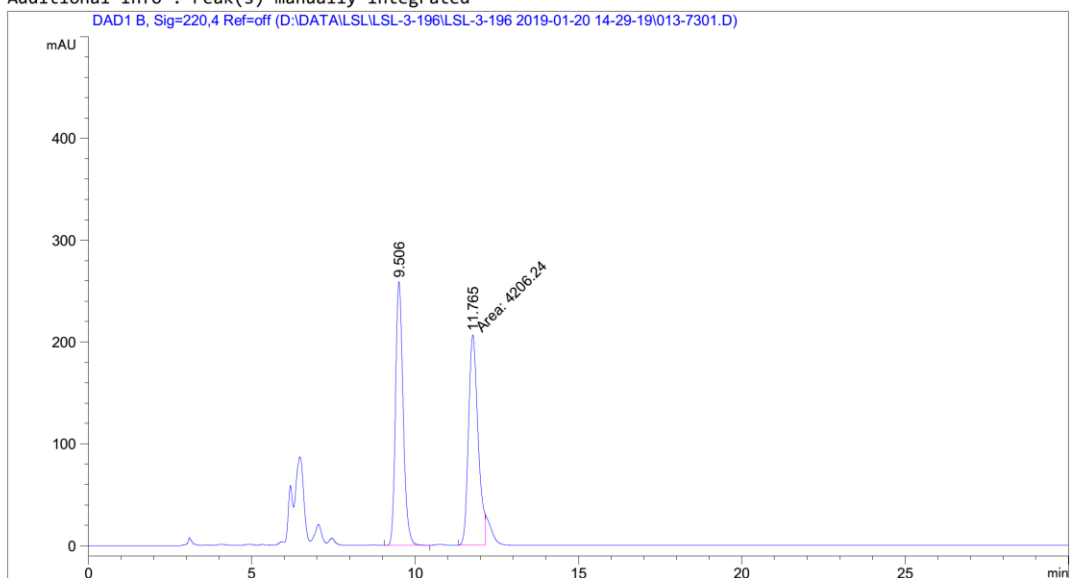
Totals :                      1.84136e4   1005.66809



Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\013-7301.D  
 Sample Name: P-CI-RAC

```
=====
Acq. Operator   :                               Seq. Line :   73
Acq. Instrument : Instrument 2                  Location  : Vial 13
Injection Date  : 1/22/2019 3:43:00 AM          Inj       :    1
                                           Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\
                  DAD-OJ(1-6)-96-4-0.8ML-SUL-ALL-90MIN.M
Last changed    : 1/22/2019 12:27:13 PM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



=====  
 Area Percent Report  
 =====

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

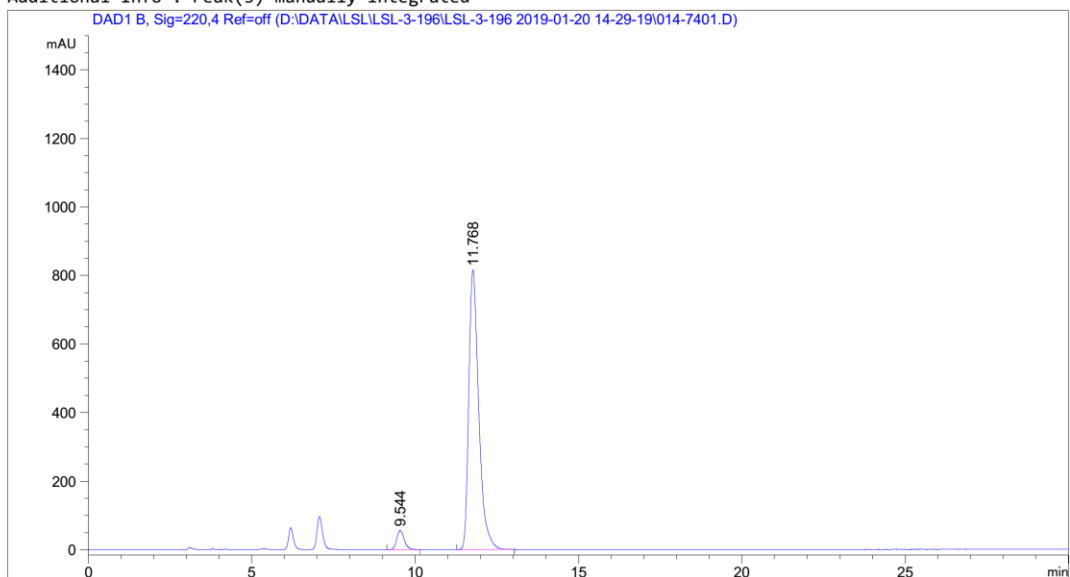
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.506	BB	0.2464	4181.17725	258.89526	49.8506
2	11.765	MF	0.3397	4206.24316	206.34270	50.1494

Totals :                      8387.42041   465.23796

Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\014-7401.D  
Sample Name: P-C1

```
=====
Acq. Operator   :                               Seq. Line :   74
Acq. Instrument : Instrument 2                   Location  : Vial 14
Injection Date  : 1/22/2019 4:23:59 AM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-OJ(1-6)-96-4-0.8ML-SUL-ALL-90MIN.M
Last changed    : 1/22/2019 12:28:48 PM
                  (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



# Area Percent Report

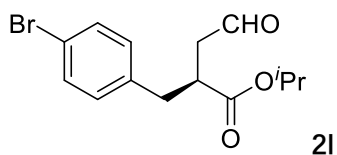
```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.544	BB	0.2478	889.68787	55.27421	4.9121
2	11.768	BB	0.3202	1.72224e4	815.96490	95.0879

Totals :                      1.81121e4    871.23912

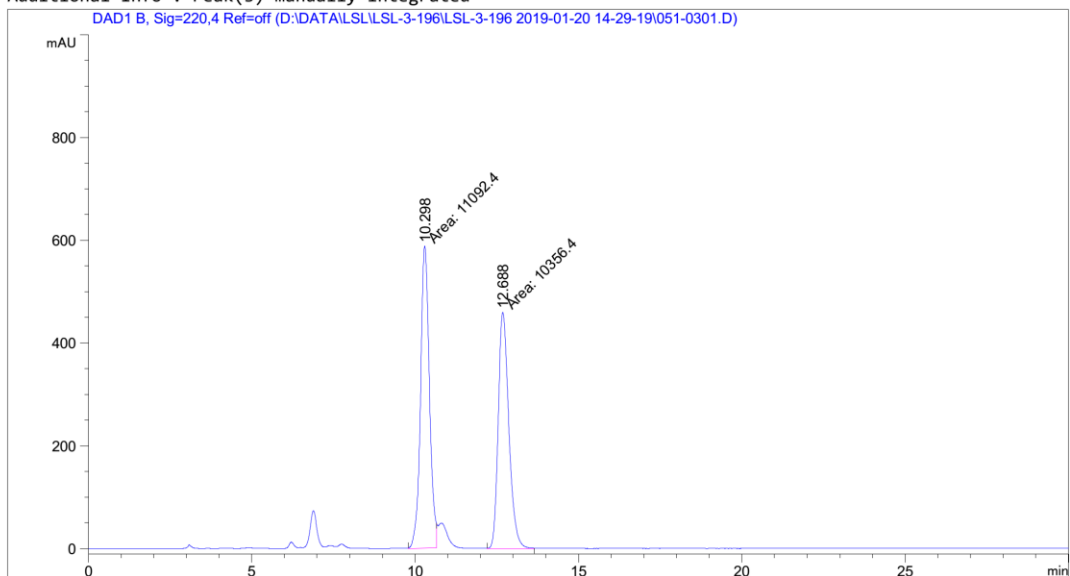




Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\051-0301.D  
Sample Name: LSL-3-168-3

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 51
Injection Date  : 1/20/2019 2:52:32 PM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 9:26:19 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



#### Area Percent Report

```
=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

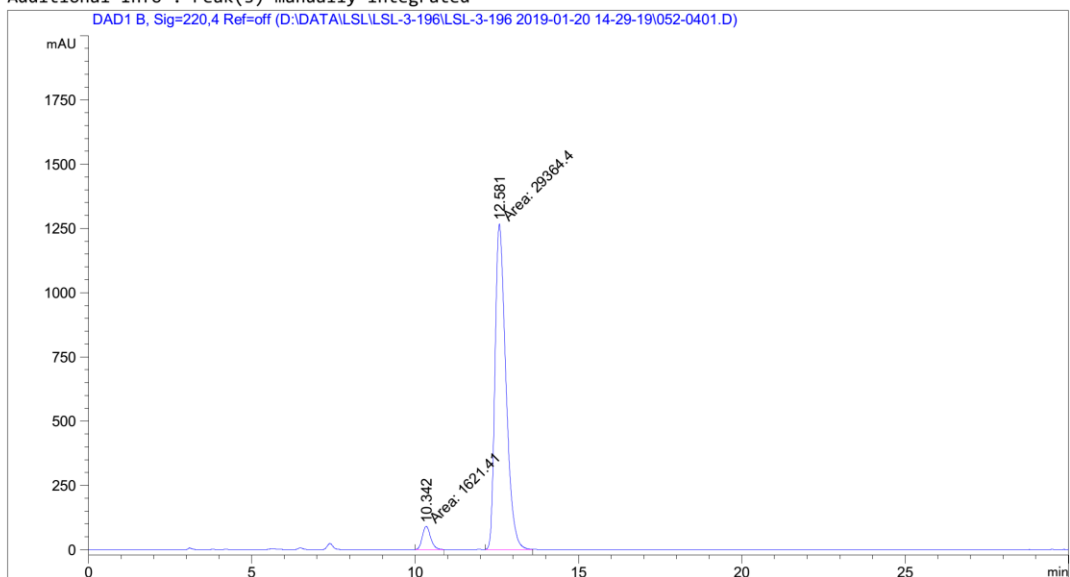
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.298	MF	0.3145	1.10924e4	587.83020	51.7157
2	12.688	MM	0.3757	1.03564e4	459.40488	48.2843

Totals :                      2.14488e4   1047.23508

Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\052-0401.D  
Sample Name: LSL-3-196-3

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 52
Injection Date  : 1/20/2019 3:33:33 PM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 9:54:04 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



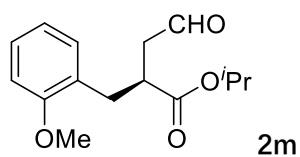
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.342	MM	0.2976	1621.41370	90.80077	5.2328
2	12.581	MM	0.3862	2.93644e4	1267.12195	94.7672

Totals : 3.09858e4 1357.92272

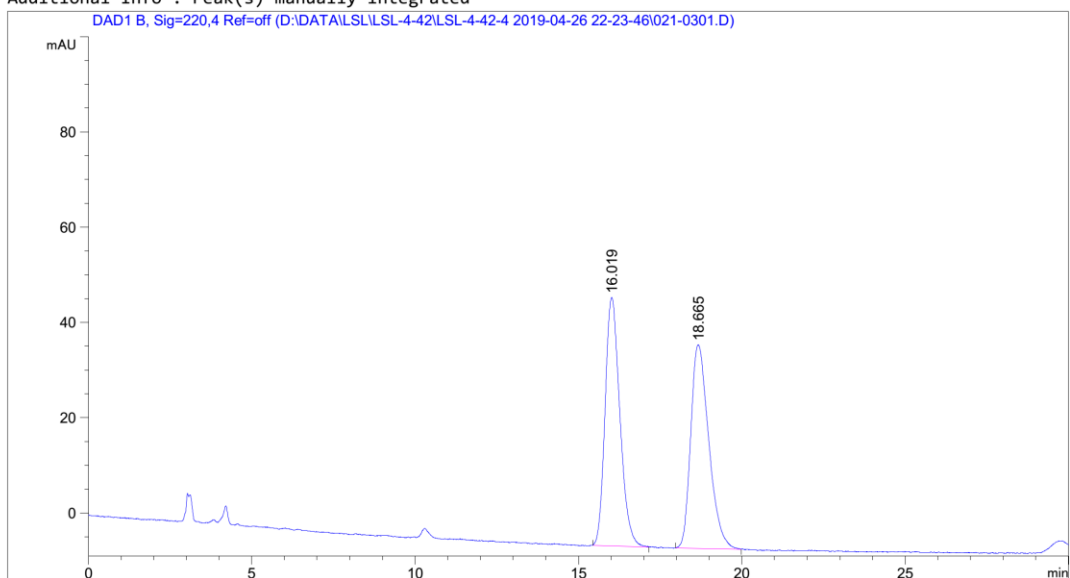


Data File D:\DATA\LSL\LSL-4-42\LSL-4-42-4 2019-04-26 22-23-46\021-0301.D

Sample Name: LSL-4-39-5

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 21
Injection Date  : 4/26/2019 10:47:41 PM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-42\LSL-4-42-4 2019-04-26 22-23-46\DAD-OD(1-2)-95-5-1ML-
                  SUL-ALL-60MIN.M
Last changed    : 6/21/2018 2:29:29 PM
Analysis Method : D:\METHOD\HZY\VWD-AS(1-6)-85-15-1ML-1UL-220NM-25MIN.M
Last changed    : 4/27/2019 10:33:13 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

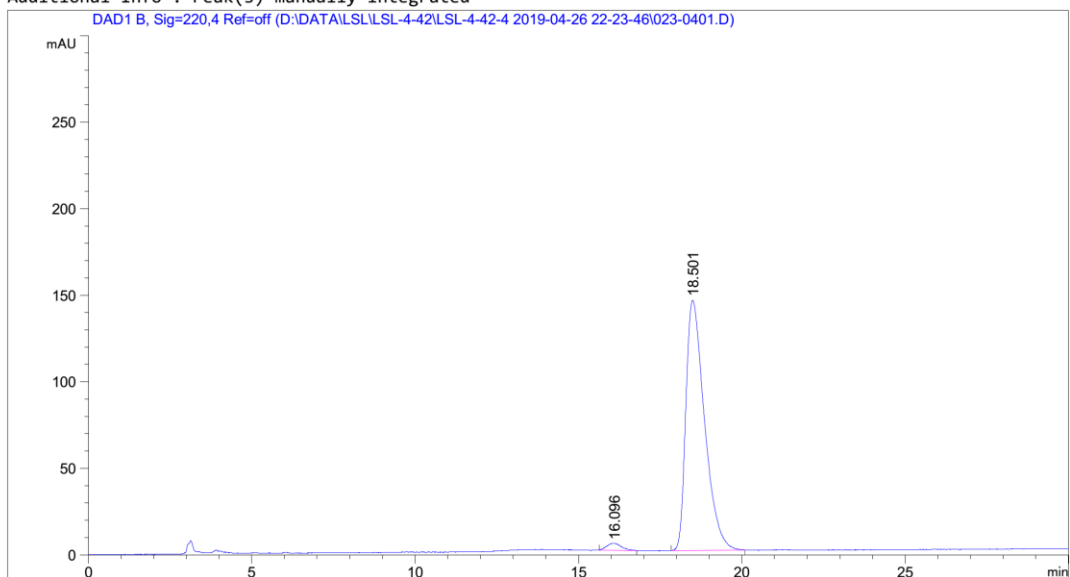
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.019	BB	0.4441	1636.83679	52.16442	49.9188
2	18.665	BB	0.5100	1642.15942	42.76224	50.0812

Totals : 3278.99622 94.92666

Data File D:\DATA\LSL\LSL-4-42\LSL-4-42-4 2019-04-26 22-23-46\023-0401.D  
Sample Name: LSL-4-42-4

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 23
Injection Date  : 4/26/2019 11:48:42 PM          Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-42\LSL-4-42-4 2019-04-26 22-23-46\DAD-OD(1-2)-95-5-1ML-
                  SUL-ALL-60MIN.M
Last changed    : 6/21/2018 2:29:29 PM
Analysis Method : D:\METHOD\HZY\VWD-AS(1-6)-85-15-1ML-1UL-220NM-25MIN.M
Last changed    : 4/27/2019 10:34:45 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



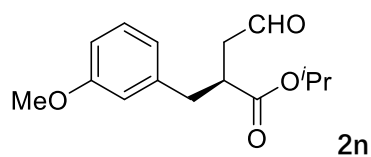
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.096	BB	0.3628	120.89717	4.02056	2.0681
2	18.501	BB	0.5697	5725.02637	144.65211	97.9319

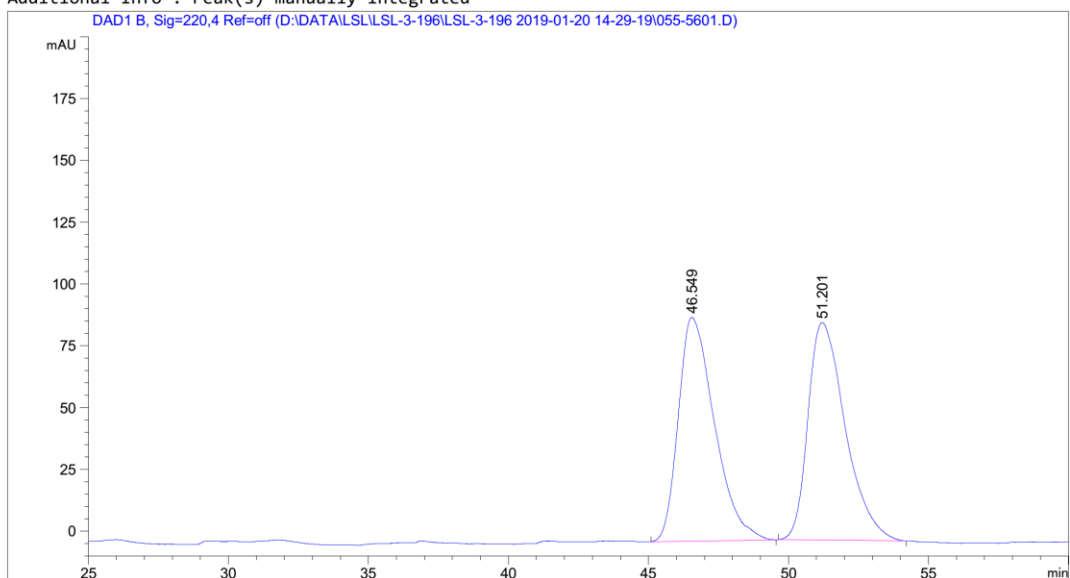
Totals :                      5845.92354   148.67267



Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\055-5601.D  
Sample Name: LSL-3-176-2-2

```
=====
Acq. Operator   :                               Seq. Line :   56
Acq. Instrument : Instrument 2                  Location  : Vial 55
Injection Date  : 1/21/2019 4:45:24 PM          Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\
SUL-ALL-60MIN.M
Last changed    : 5/29/2018 11:41:42 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 9:15:49 PM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



#### Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

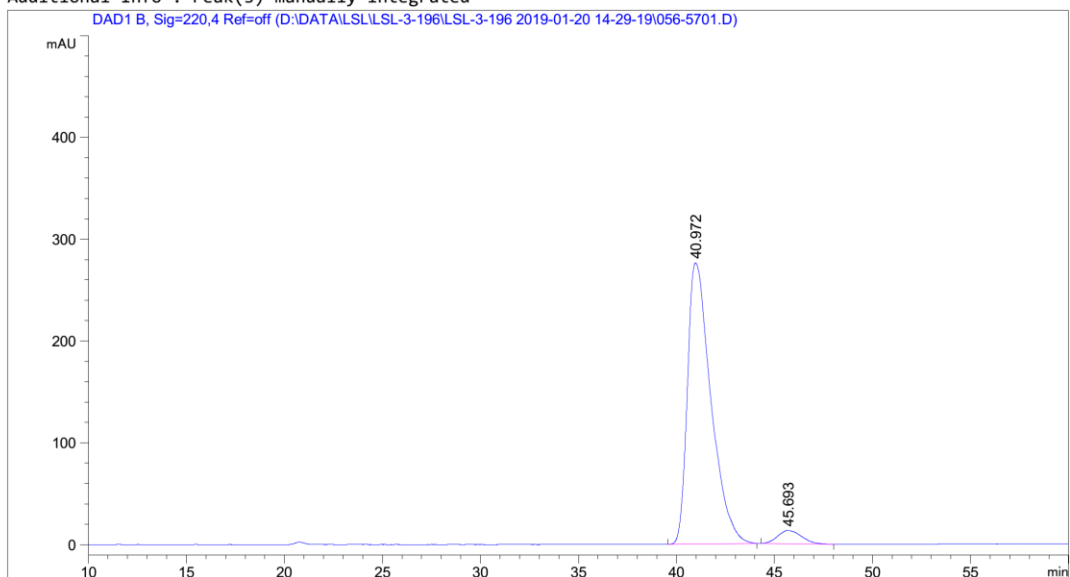
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	46.549	BB	1.1849	8106.61768	90.51544	49.8825
2	51.201	BB	1.2340	8144.81543	87.98081	50.1175

Totals :                      1.62514e4    178.49625

Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\056-5701.D  
Sample Name: LSL-3-196-5-2

```
=====
Acq. Operator   :                               Seq. Line :   57
Acq. Instrument : Instrument 2                   Location  : Vial 56
Injection Date  : 1/21/2019 5:46:25 PM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\
DAD-OD(1-2)-99-1-1ML-
SUL-ALL-60MIN.M
Last changed    : 5/29/2018 11:41:42 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 9:22:51 PM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



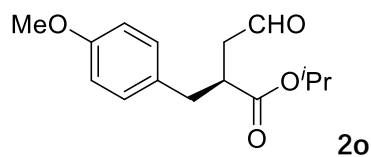
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	40.972	BB	1.1852	2.29957e4	276.23962	95.3650
2	45.693	BB	0.9984	1117.64856	13.13866	4.6350

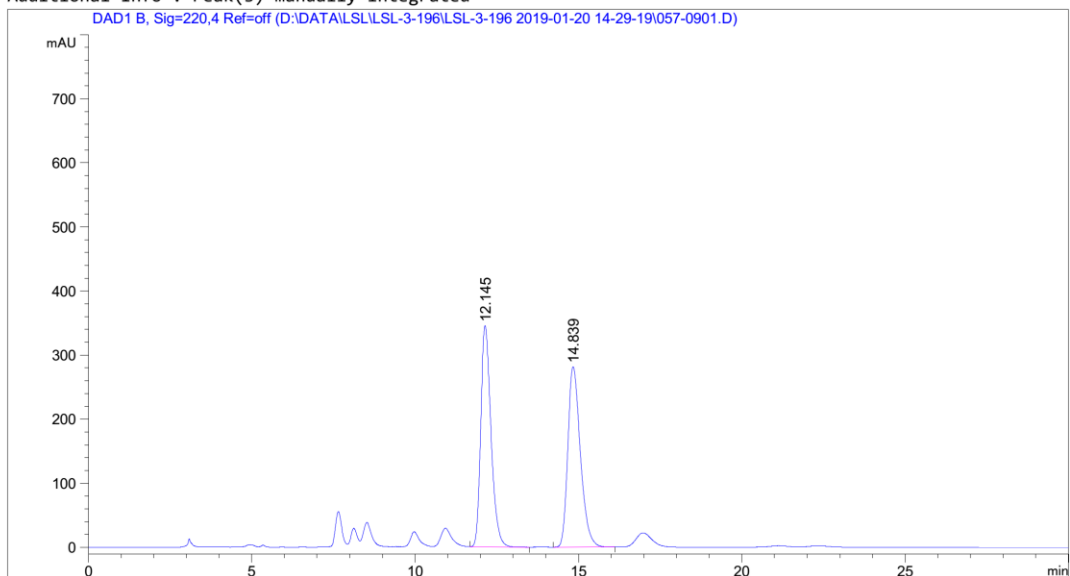
Totals :                      2.41133e4    289.37828



Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\057-0901.D  
Sample Name: LSL-3-176-3

```
=====
Acq. Operator   :                               Seq. Line :    9
Acq. Instrument : Instrument 2                   Location  : Vial 57
Injection Date  : 1/20/2019 6:58:39 PM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 10:00:12 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
=====
```



#### Area Percent Report

```
=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

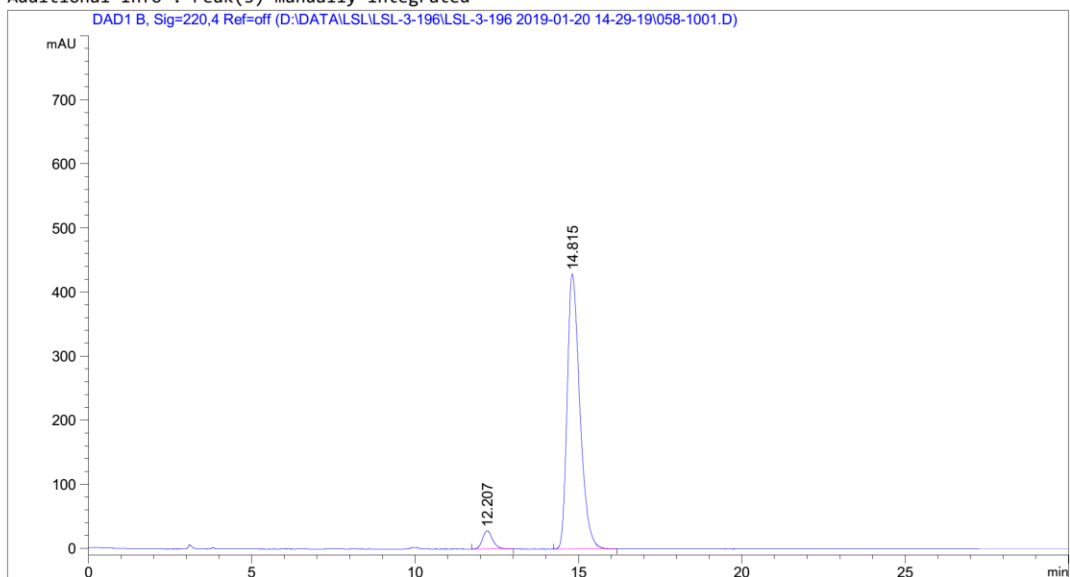
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.145	VB	0.3320	7520.88916	345.47867	49.9976
2	14.839	BB	0.4057	7521.61328	281.50827	50.0024

Totals :                      1.50425e4    626.98694

Data File D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\058-1001.D  
Sample Name: LSL-3-196-6

```
=====
Acq. Operator   :                               Seq. Line :   10
Acq. Instrument : Instrument 2                   Location  : Vial 58
Injection Date  : 1/20/2019 7:39:39 PM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-3-196\LSL-3-196 2019-01-20 14-29-19\
DAD-OD(1-2)-98-2-1ML-
SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\LG\DAD-OD(1-2)-99-1-0.5ML-SUL-ALL-100MIN.M
Last changed    : 1/21/2019 10:00:12 PM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

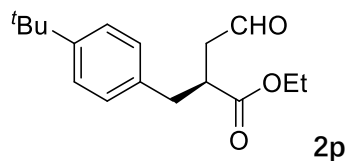
```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.207	BB	0.3225	611.11481	28.23827	5.0254
2	14.815	BB	0.4101	1.15495e4	429.02994	94.9746

Totals :                      1.21606e4    457.26821

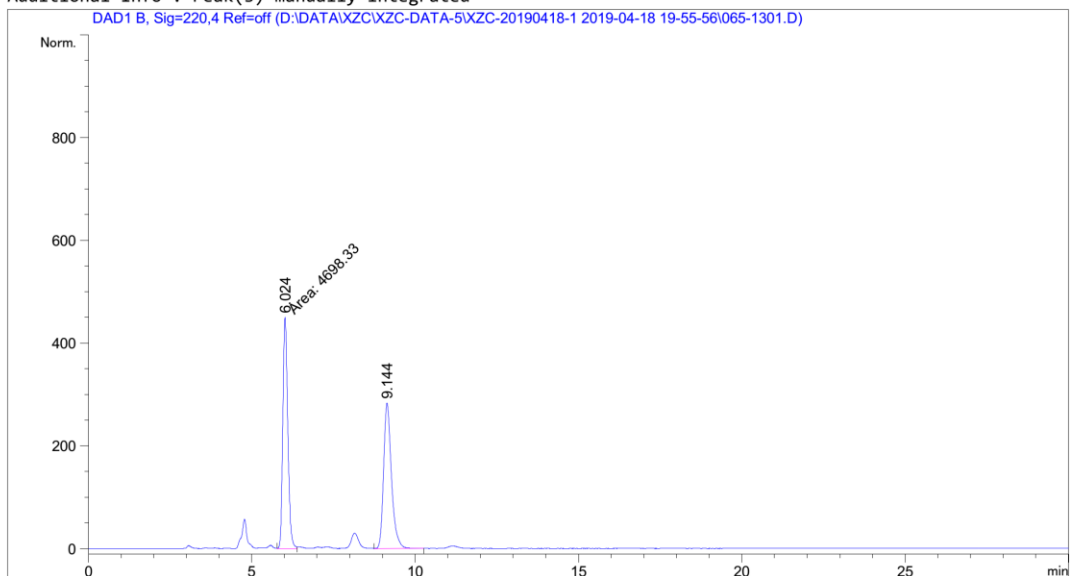




Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\065-1301.D  
Sample Name: LSL-tBu rac

```
=====
Acq. Operator   :                               Seq. Line :   13
Acq. Instrument : Instrument 2                   Location  : Vial 65
Injection Date  : 4/19/2019 1:07:18 AM          Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\DAD-OD(1-2)-95-5-
                  1ML-5UL-ALL-60MIN.M
Last changed    : 6/21/2018 2:29:29 PM
Analysis Method : D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\DAD-OD(1-2)-95-5-
                  1ML-5UL-ALL-60MIN.M (Sequence Method)
Last changed    : 4/19/2019 10:31:52 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



#### Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

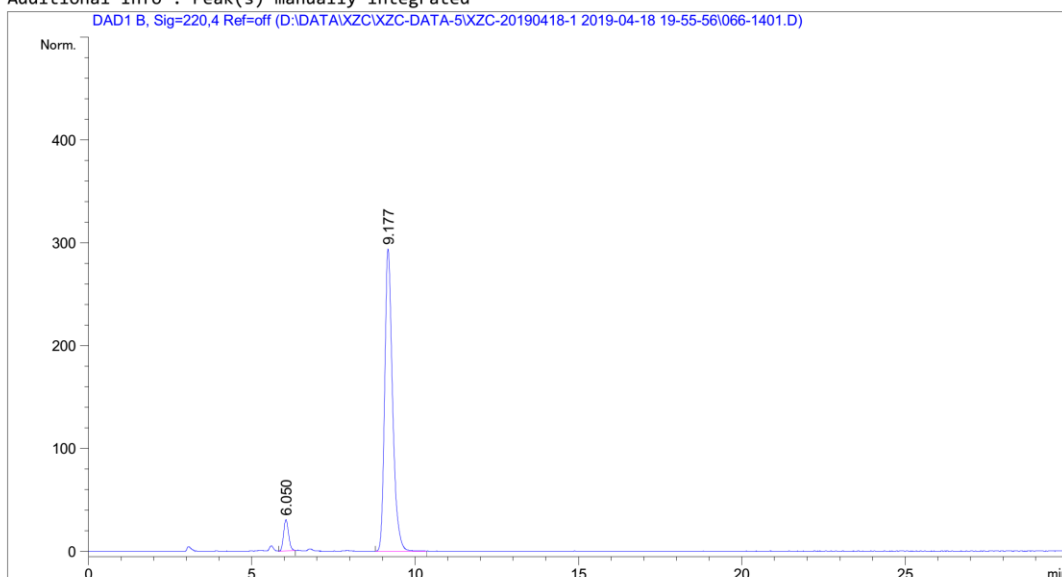
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.024	MF	0.1740	4698.32861	449.96259	49.8533
2	9.144	BB	0.2527	4725.97656	283.19824	50.1467

Totals :                      9424.30518   733.16083

Data File D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\066-1401.D  
Sample Name: LSL-tBu

```
=====
Acq. Operator   :                               Seq. Line :   14
Acq. Instrument : Instrument 2                   Location  : Vial 66
Injection Date  : 4/19/2019 2:08:21 AM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\DAD-OD(1-2)-95-5-
                  1ML-5UL-ALL-60MIN.M
Last changed    : 6/21/2018 2:29:29 PM
Analysis Method : D:\DATA\XZC\XZC-DATA-5\XZC-20190418-1 2019-04-18 19-55-56\DAD-OD(1-2)-95-5-
                  1ML-5UL-ALL-60MIN.M (Sequence Method)
Last changed    : 4/19/2019 10:33:29 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



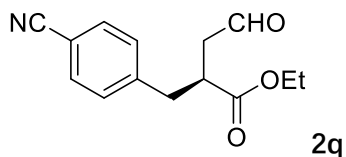
Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.050	BB	0.1587	313.38785	30.30317	5.9826
2	9.177	BB	0.2557	4924.97021	293.62207	94.0174

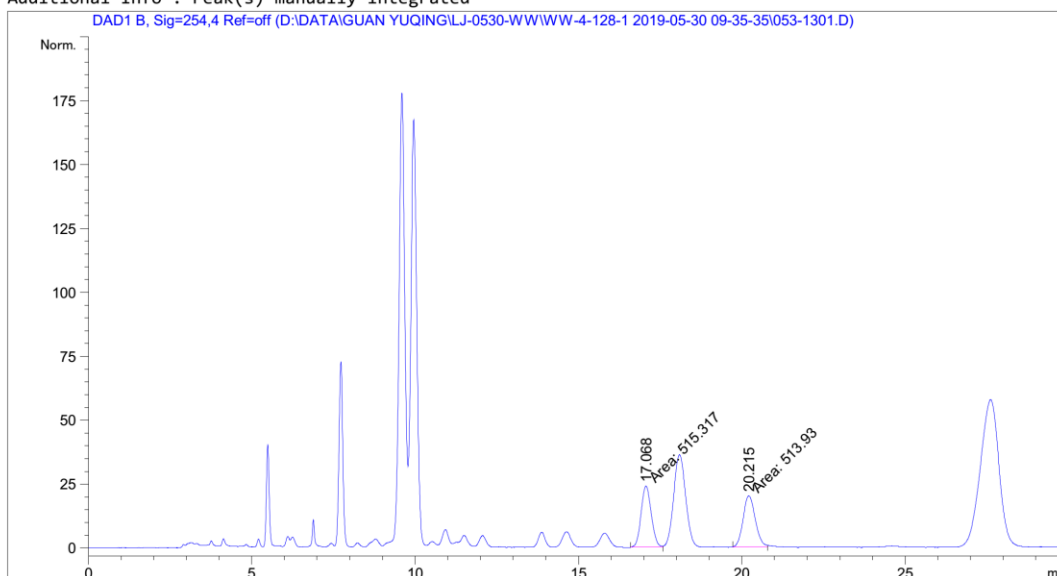
Totals :                      5238.35806   323.92525



Data File D:\DATA\GUAN YUQING\LJ-0530-WW\WW-4-128-1 2019-05-30 09-35-35\053-1301.D  
Sample Name: LSL-4-P-CN RAC

```
=====
Acq. Operator   :                               Seq. Line :   13
Acq. Instrument : Instrument 2                   Location  : Vial 53
Injection Date  : 5/30/2019 3:21:06 PM           Inj       :    1
                                           Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\GUAN YUQING\LJ-0530-WW\WW-4-128-1 2019-05-30 09-35-35\DAD-AD(1-2)-
                  90-10-1ML-5UL-ALL-40MIN.M
Last changed    : 5/30/2019 10:39:11 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-AD(1-2)-99-1-0.5ML-5UL-ALL-60MIN.M
Last changed    : 5/31/2019 10:24:46 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

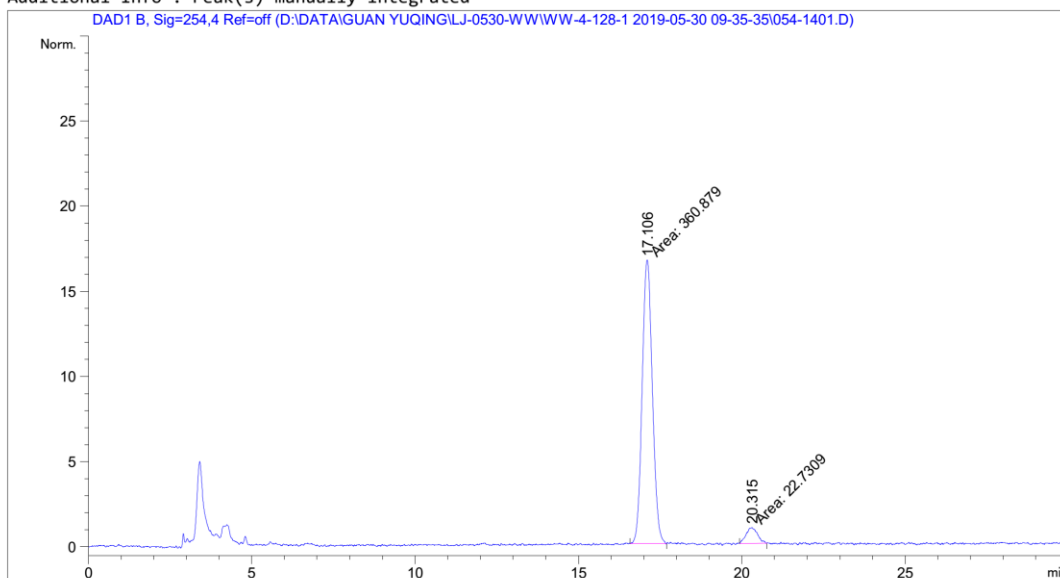
Signal 1: DAD1 B, Sig=254,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	17.068	MM	0.3594	515.31714	23.90012	50.0674
2	20.215	MM	0.4295	513.93018	19.94221	49.9326

Totals :                      1029.24731    43.84233

Data File D:\DATA\GUAN YUQING\LJ-0530-WW\WW-4-128-1 2019-05-30 09-35-35\054-1401.D  
Sample Name: LSL-4-P-CN

```
=====
Acq. Operator   :                               Seq. Line :   14
Acq. Instrument : Instrument 2                   Location  : Vial 54
Injection Date  : 5/30/2019 4:02:10 PM          Inj       :    1
                                                Inj Volume: 5.000 µl
Acq. Method     : D:\DATA\GUAN YUQING\LJ-0530-WW\WW-4-128-1 2019-05-30 09-35-35\DAD-AD(1-2)-
                                                90-10-1ML-5UL-ALL-40MIN.M
Last changed    : 5/30/2019 10:39:11 AM
Analysis Method : D:\METHOD\GUAN YUQING\DAD-AD(1-2)-99-1-0.5ML-5UL-ALL-60MIN.M
Last changed    : 5/31/2019 10:30:14 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



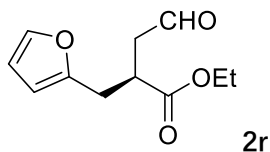
Area Percent Report

```
=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=254,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	17.106	MM	0.3612	360.87930	16.65151	94.0745
2	20.315	MM	0.4038	22.73090	9.38171e-1	5.9255

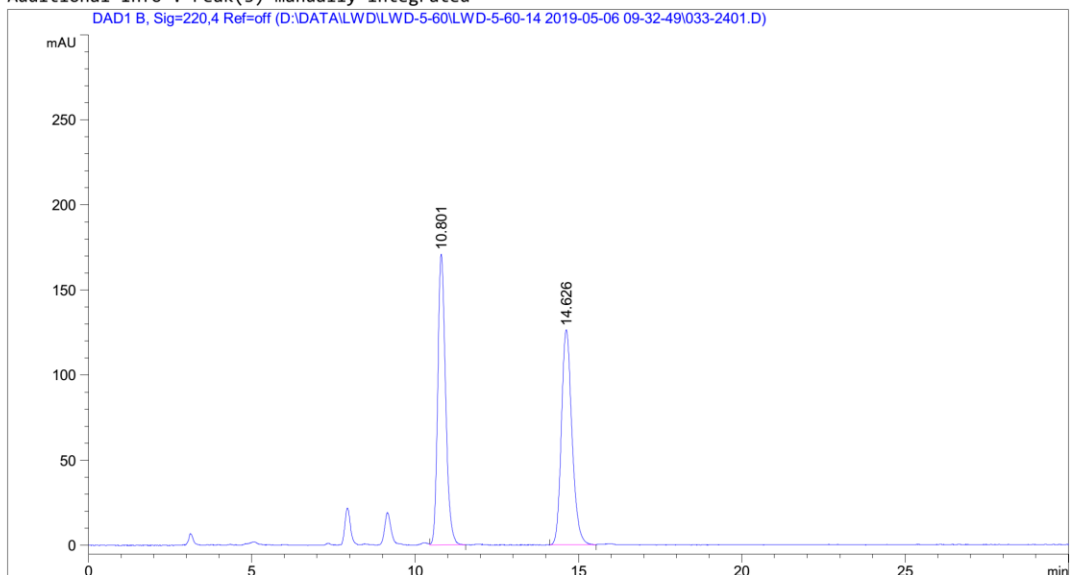
Totals :                      383.61020    17.58968



Data File D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\033-2401.D  
 Sample Name: funan rac-

```
=====
Acq. Operator   :                               Seq. Line :   24
Acq. Instrument : Instrument 2                   Location  : Vial 33
Injection Date  : 5/6/2019 10:58:28 PM           Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 5/6/2019 9:51:19 PM
                  (modified after loading)
Analysis Method : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M (Sequence Method)
Last changed    : 5/7/2019 9:27:45 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



#### Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

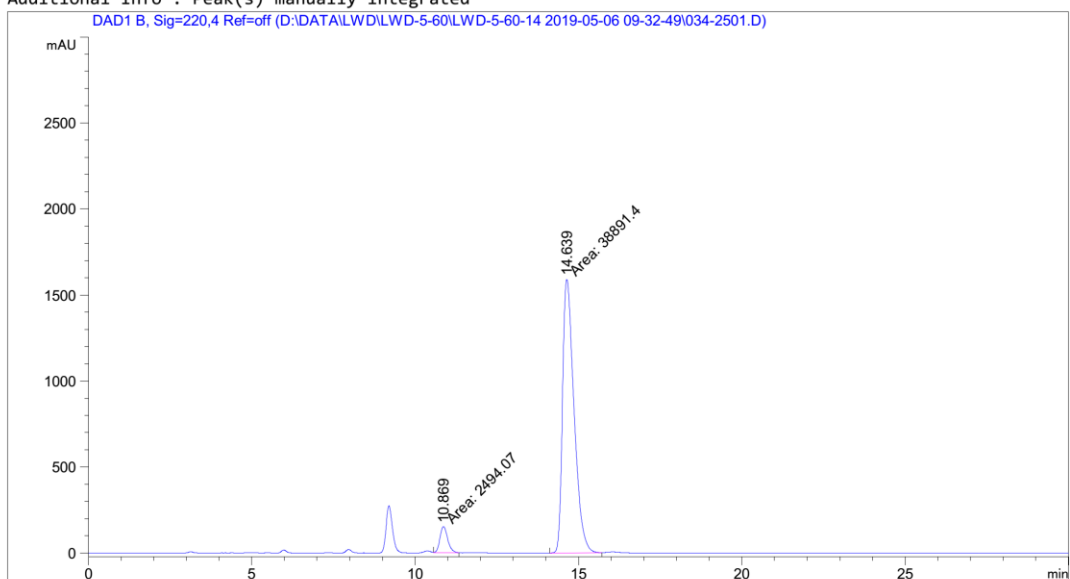
Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.801	VB	0.2541	2842.55835	170.88455	49.9906
2	14.626	BB	0.3407	2843.62280	126.29852	50.0094

Totals :                      5686.18115    297.18307

Data File D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\034-2501.D  
Sample Name: funan

```
=====
Acq. Operator   :                               Seq. Line :   25
Acq. Instrument : Instrument 2                  Location  : Vial 34
Injection Date  : 5/6/2019 11:49:27 PM          Inj       :    1
                                                Inj Volume: 5.000 µl
Acq. Method     : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                    SUL-ALL-40MIN.M
Last changed    : 5/6/2019 9:51:19 PM
                    (modified after loading)
Analysis Method : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                    SUL-ALL-40MIN.M (Sequence Method)
Last changed    : 5/7/2019 9:30:14 AM
                    (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



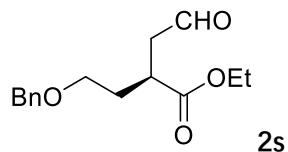
Area Percent Report

```
=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

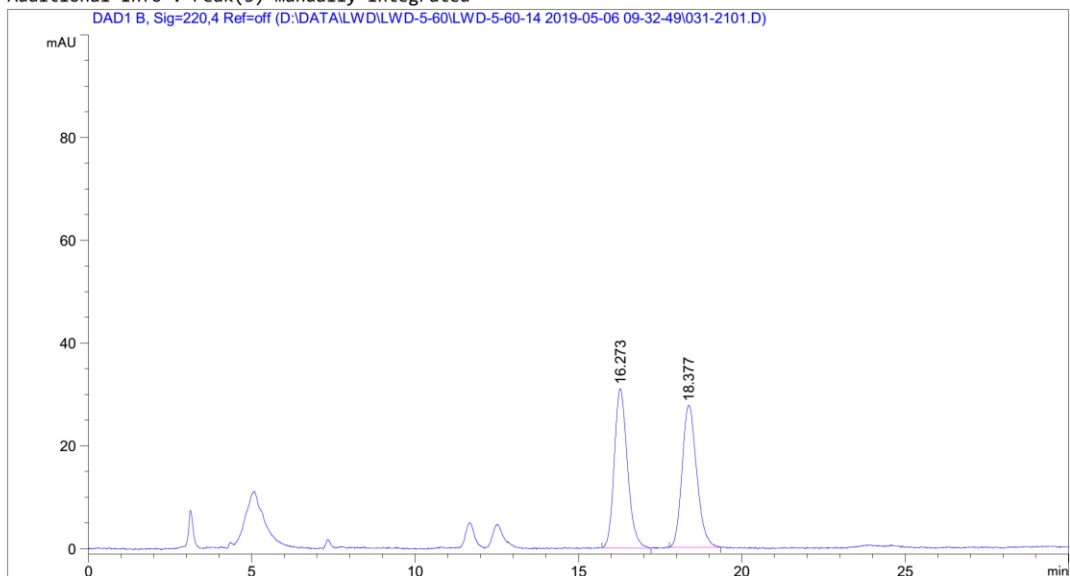
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.869	MM	0.2743	2494.06567	151.53320	6.0264
2	14.639	MM	0.4075	3.88914e4	1590.57520	93.9736

Totals : 4.13855e4 1742.10840



Data File D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\031-2101.D  
Sample Name: BnO rac-

```
=====
Acq. Operator   :                               Seq. Line :   21
Acq. Instrument : Instrument 2                   Location  : Vial 31
Injection Date  : 5/6/2019 8:35:24 PM           Inj       :    1
                                                Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M (Sequence Method)
Last changed    : 5/7/2019 9:22:30 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

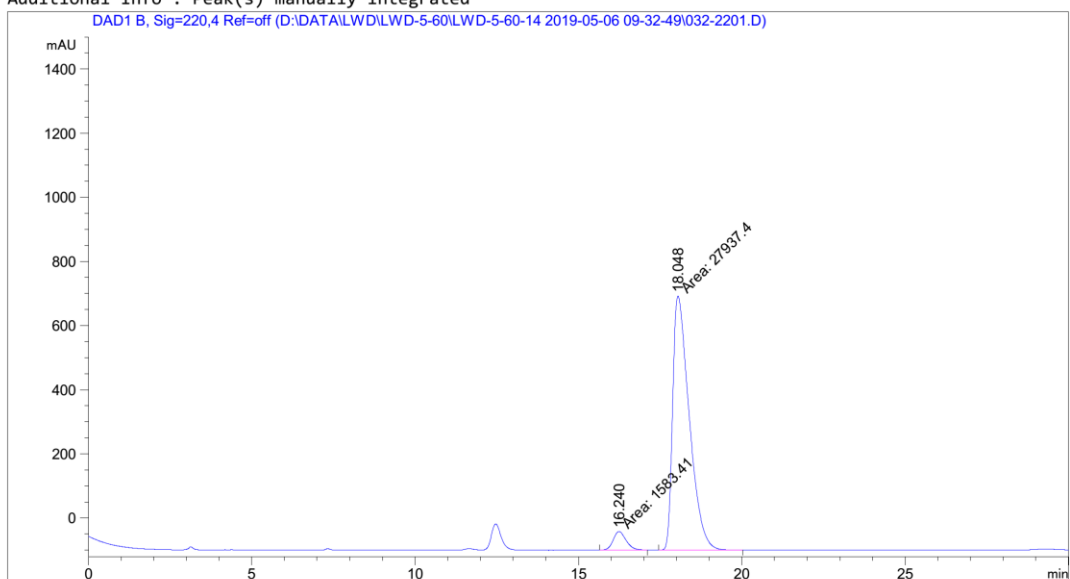
Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.273	BB	0.3565	868.73853	31.04607	50.1585
2	18.377	BB	0.3698	863.24677	27.68279	49.8415

Totals : 1731.98529 58.72885

Data File D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\032-2201.D  
Sample Name: BnO

```
=====
Acq. Operator   :                               Seq. Line :   22
Acq. Instrument : Instrument 2                   Location  : Vial 32
Injection Date  : 5/6/2019 9:16:25 PM           Inj       :    1
                                                Inj Volume: 5.000 µl
Acq. Method     : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                    SUL-ALL-40MIN.M
Last changed    : 5/6/2019 9:51:19 PM
                    (modified after loading)
Analysis Method : D:\DATA\LWD\LWD-5-60\LWD-5-60-14 2019-05-06 09-32-49\DAD-OD(1-2)-98-2-1ML-
                    SUL-ALL-40MIN.M (Sequence Method)
Last changed    : 5/7/2019 9:24:41 AM
                    (modified after loading)
Additional Info : Peak(s) manually integrated
```



=====  
Area Percent Report  
=====

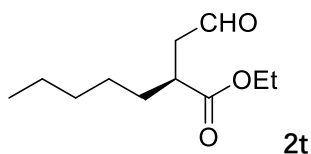
Sorted By : Signal  
Multiplier : 1.0000  
Dilution : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.240	MM	0.4576	1583.40942	57.67647	5.3637
2	18.048	MM	0.5880	2.79374e4	791.87537	94.6363

Totals : 2.95208e4 849.55183

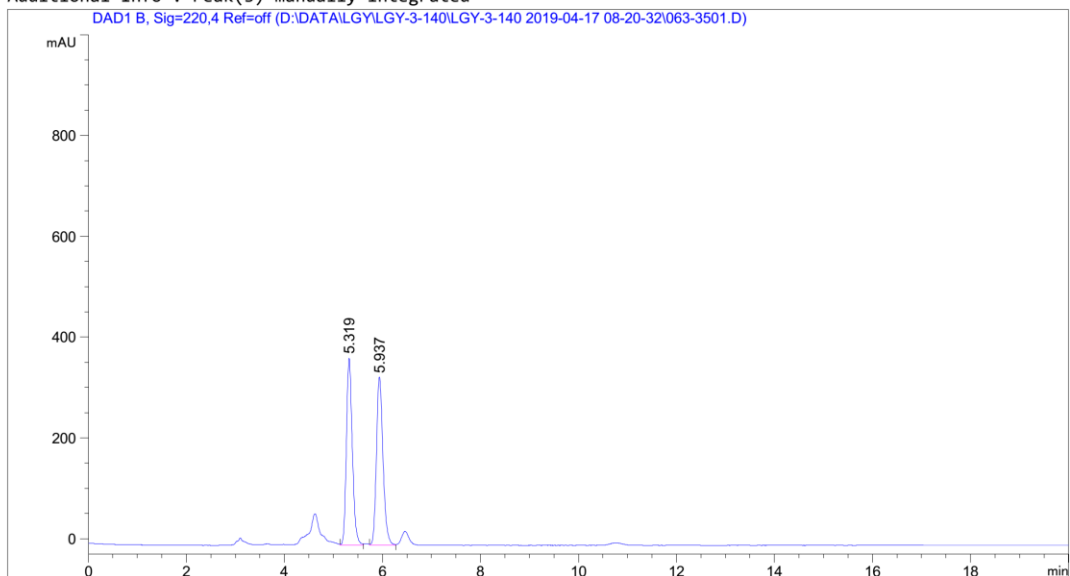




Data File D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\063-3501.D  
Sample Name: LSL-he rac-

```

=====
Acq. Operator   :                               Seq. Line :   35
Acq. Instrument : Instrument 2                  Location  : Vial 63
Injection Date  : 4/18/2019 12:37:17 AM         Inj       :    1
                                           Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\DAD-OD(1-2)-98-2-1ML-
                                           SUL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\DATA\LGY\LGY-3-140\LGY-3-140 2019-04-17 08-20-32\DAD-OD(1-2)-98-2-1ML-
                                           SUL-ALL-40MIN.M (Sequence Method)
Last changed    : 4/18/2019 11:25:39 AM
                                           (modified after loading)
Additional Info : Peak(s) manually integrated
  
```



# Area Percent Report

```

Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

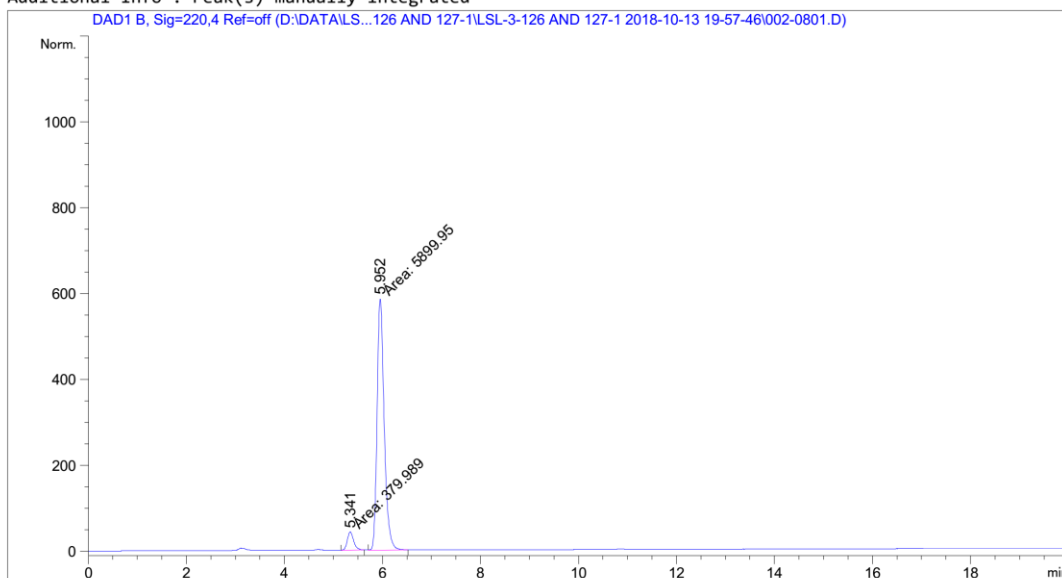
Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.319	VV	0.1280	3114.99536	370.68976	50.0472
2	5.937	VV	0.1428	3109.11621	333.35901	49.9528

Totals : 6224.11157 704.04877

Data File D:\DATA\LS...-3-126 AND 127-1\LSL-3-126 AND 127-1 2018-10-13 19-57-46\002-0801.D  
Sample Name: LSL-3-127-1-2

```
=====
Acq. Operator   :                               Seq. Line :    8
Acq. Instrument : Instrument 2                   Location  : Vial 2
Injection Date  : 10/13/2018 10:16:16 PM        Inj       :    1
                                                Inj Volume: 5.000 µl
Acq. Method     : D:\DATA\LSL\LSL-3-126 AND 127-1\LSL-3-126 AND 127-1 2018-10-13 19-57-46\DAD
                  -OD(1-2)-98-2-1ML-5UL-ALL-40MIN.M
Last changed    : 9/21/2018 9:52:07 AM
Analysis Method : D:\METHOD\GUAN YUQING\LONGJIAO\VWD-AS(1-6)-95-5-0.5ML-5UL-220NM-10MIN.M
Last changed    : 4/18/2019 11:18:58 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



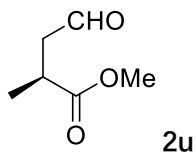
# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

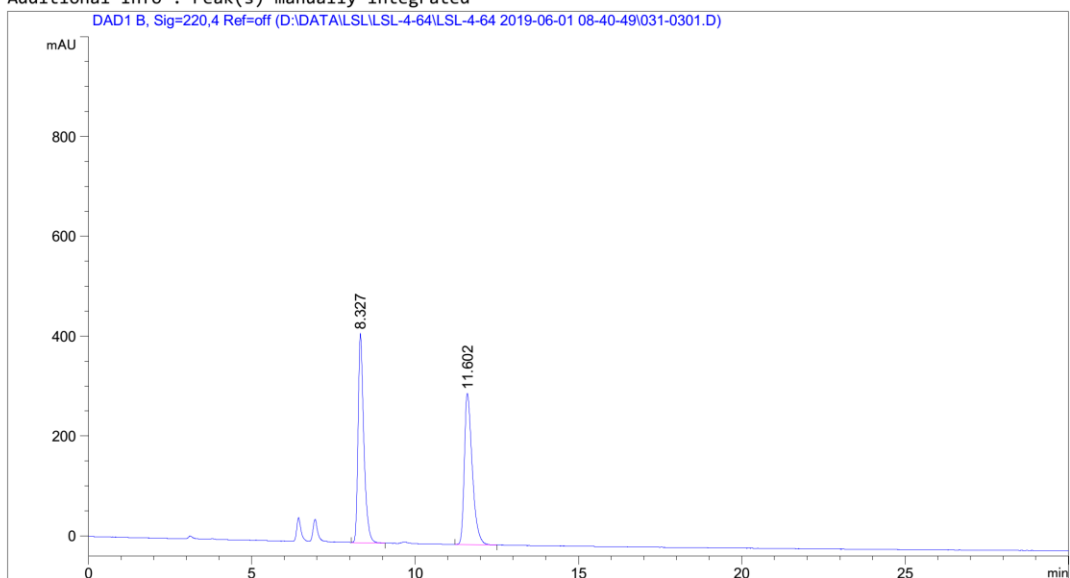
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.341	MM	0.1480	379.98932	42.78594	6.0508
2	5.952	MM	0.1679	5899.94971	585.57678	93.9492

Totals : 6279.93903 628.36272



Data File D:\DATA\LSL\LSL-4-64\LSL-4-64 2019-06-01 08-40-49\031-0301.D  
Sample Name: LSL-4-64-1-RAC

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 31
Injection Date  : 6/1/2019 9:06:18 AM           Inj       :    1
                                                Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LSL\LSL-4-64\LSL-4-64 2019-06-01 08-40-49\
DAD-OD(1-6)-98-2-1ML-5UL-ALL-40MIN.M
Last changed    : 5/25/2019 3:07:40 PM
Analysis Method : D:\METHOD\LSL\DAD-OD(1-6)-90-10-1ML-5UL-ALL-40MIN.M
Last changed    : 6/1/2019 2:39:21 PM
                (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

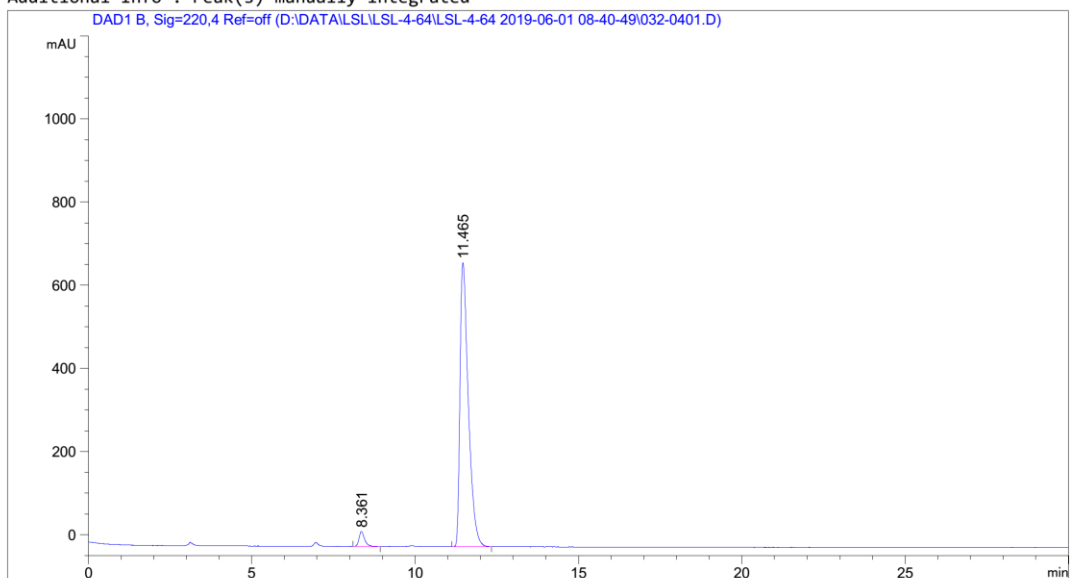
Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.327	BB	0.1850	5131.59619	418.59070	50.1290
2	11.602	BB	0.2526	5105.17969	303.02502	49.8710

Totals : 1.02368e4 721.61572

Data File D:\DATA\LSL\LSL-4-64\LSL-4-64 2019-06-01 08-40-49\032-0401.D  
Sample Name: LSL-4-64-1

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 32
Injection Date  : 6/1/2019 9:47:18 AM           Inj       :    1
                                                Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LSL\LSL-4-64\LSL-4-64 2019-06-01 08-40-49\DAD-OD(1-6)-98-2-1ML-5UL-
                  ALL-40MIN.M
Last changed    : 5/25/2019 3:07:40 PM
Analysis Method : D:\METHOD\LSL\DAD-OD(1-6)-90-10-1ML-5UL-ALL-40MIN.M
Last changed    : 6/1/2019 2:41:53 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



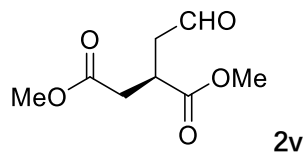
=====  
Area Percent Report  
=====

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

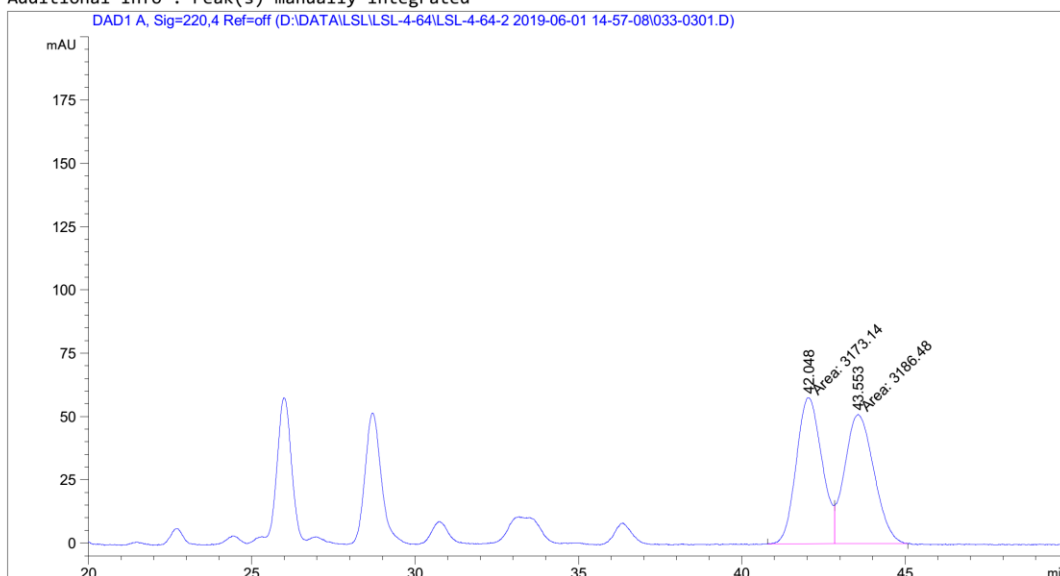
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.361	BB	0.1836	433.71613	36.25093	3.4675
2	11.465	BB	0.2660	1.20743e4	683.69055	96.5325

Totals :                      1.25080e4    719.94149



Data File D:\DATA\LSL\LSL-4-64\LSL-4-64-2 2019-06-01 14-57-08\033-0301.D  
 Sample Name: LSL-4-64-3-RAC

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                   Location  : Vial 33
Injection Date  : 6/1/2019 3:20:16 PM           Inj       :    1
                                           Inj Volume : 5.000 µl
Acq. Method     : D:\DATA\LSL\LSL-4-64\LSL-4-64-2 2019-06-01 14-57-08\
                    SUL-ALL-60MIN.M
Last changed    : 6/1/2019 2:47:56 PM
Analysis Method : D:\METHOD\LSL\DAD-AD(1-2)-99-1-0.5ML-5UL-ALL-10MIN.M
Last changed    : 6/1/2019 6:01:45 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	42.048	MF	0.9163	3173.14380	57.71503	49.8951
2	43.553	FM	1.0417	3186.48486	50.98162	50.1049

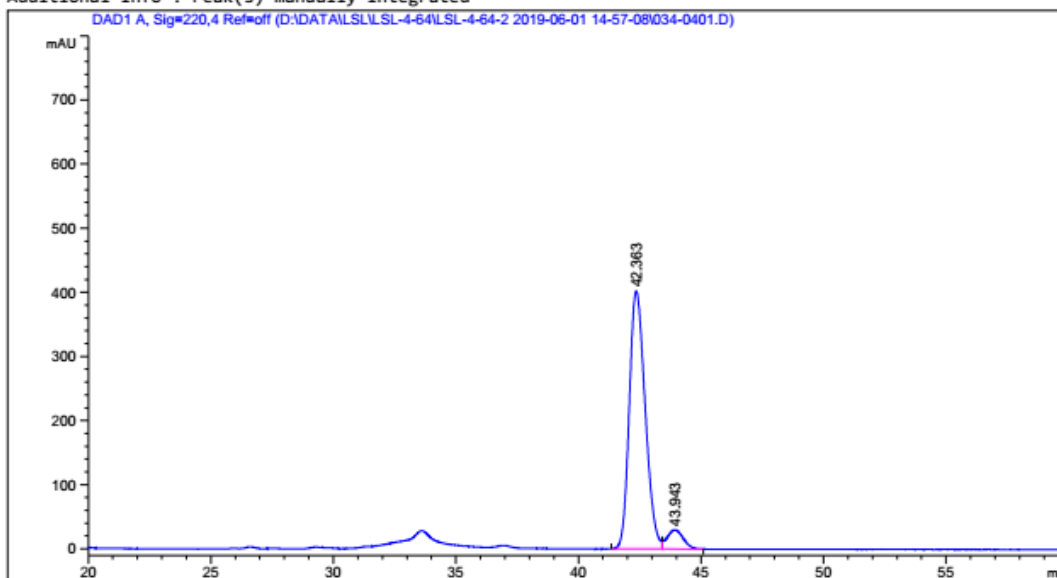
Totals :                      6359.62866   108.69665

Data File D:\DATA\LSL\LSL-4-64\LSL-4-64-2 2019-06-01 14-57-08\034-0401.D  
Sample Name: LSL-4-64-3

```

=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                  Location  : Vial 34
Injection Date  : 6/1/2019 4:21:16 PM           Inj       :    1
                                                Inj Volume: 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-64\LSL-4-64-2 2019-06-01 14-57-08\DAD-AD(1-2)-99-1-0.5ML-
                    SUL-ALL-60MIN.M
Last changed    : 6/1/2019 2:47:56 PM
Analysis Method : D:\METHOD\LSL\DAD-AD(1-2)-99-1-0.5ML-5UL-ALL-10MIN.M
Last changed    : 6/1/2019 6:04:36 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
  
```



# Area Percent Report

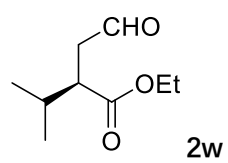
```

=====
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: DAD1 A, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	42.363	BV	0.6521	1.81315e4	402.07605	93.0210
2	43.943	VB	0.5456	1360.34131	29.85603	6.9790

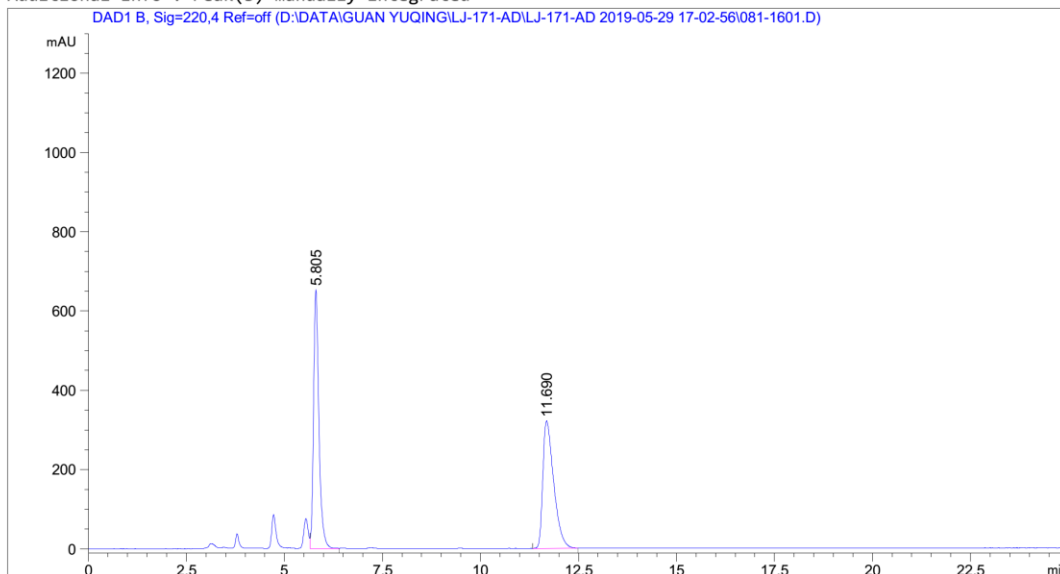
Totals : 1.94918e4 431.93208



Data File D:\DATA\GUAN YUQING\LJ-171-AD\LJ-171-AD 2019-05-29 17-02-56\081-1601.D  
Sample Name: LSL-4-61-rac

```
=====
Acq. Operator   :                               Seq. Line :   16
Acq. Instrument : Instrument 2                   Location  : Vial 81
Injection Date  : 5/29/2019 10:52:16 PM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\GUAN YUQING\LJ-171-AD\LJ-171-AD 2019-05-29 17-02-56\DAD-OD(1-6)-98-
                  2-1ML-5UL-ALL-40MIN.M
Last changed    : 5/25/2019 3:07:40 PM
Analysis Method : D:\METHOD\LWD\DAD-AD(1-6)-95-5-1ML-3UL-ALL-30MIN-0813.M
Last changed    : 8/13/2019 8:09:00 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



# Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.805	VB	0.1423	6170.86377	652.65344	49.9608
2	11.690	BV	0.2903	6180.55566	321.54147	50.0392

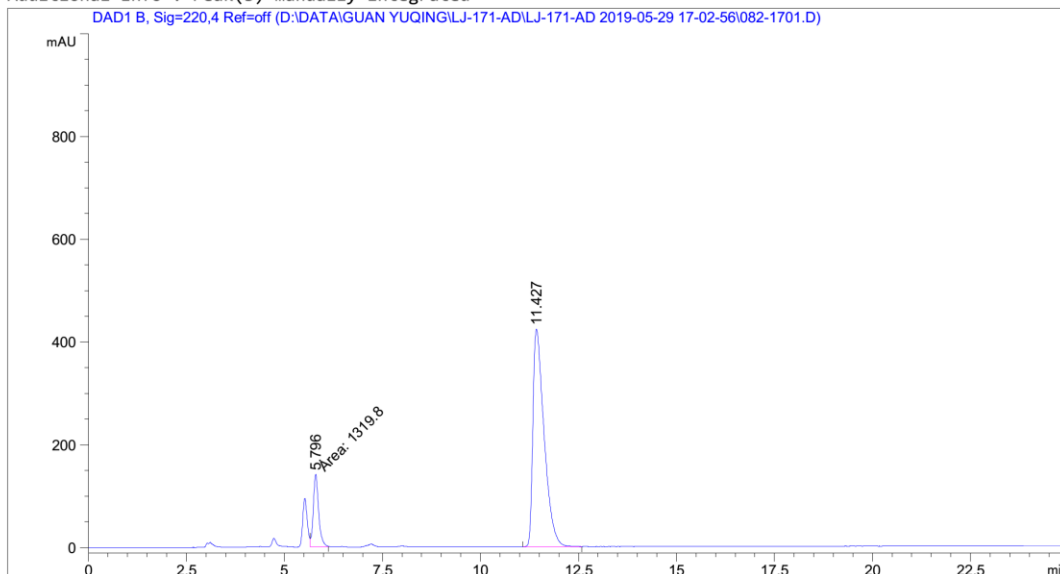
Totals : 1.23514e4 974.19492



Data File D:\DATA\GUAN YUQING\LJ-171-AD\LJ-171-AD 2019-05-29 17-02-56\082-1701.D  
Sample Name: LSL-4-61

```
=====
Acq. Operator   :                               Seq. Line :   17
Acq. Instrument : Instrument 2                   Location  : Vial 82
Injection Date  : 5/29/2019 11:33:13 PM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\GUAN YUQING\LJ-171-AD\LJ-171-AD 2019-05-29 17-02-56\DAD-OD(1-6)-98-
                  2-1ML-5UL-ALL-40MIN.M
Last changed    : 5/25/2019 3:07:40 PM
Analysis Method : D:\METHOD\LWD\DAD-AD(1-6)-95-5-1ML-3UL-ALL-30MIN-0813.M
Last changed    : 8/13/2019 8:07:14 PM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



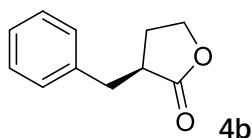
=====  
Area Percent Report  
=====

Sorted By : Signal  
Multiplier : 1.0000  
Dilution : 1.0000  
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	5.796	FM	0.1558	1319.80078	141.18221	13.5841
2	11.427	BB	0.2933	8395.98242	423.57257	86.4159

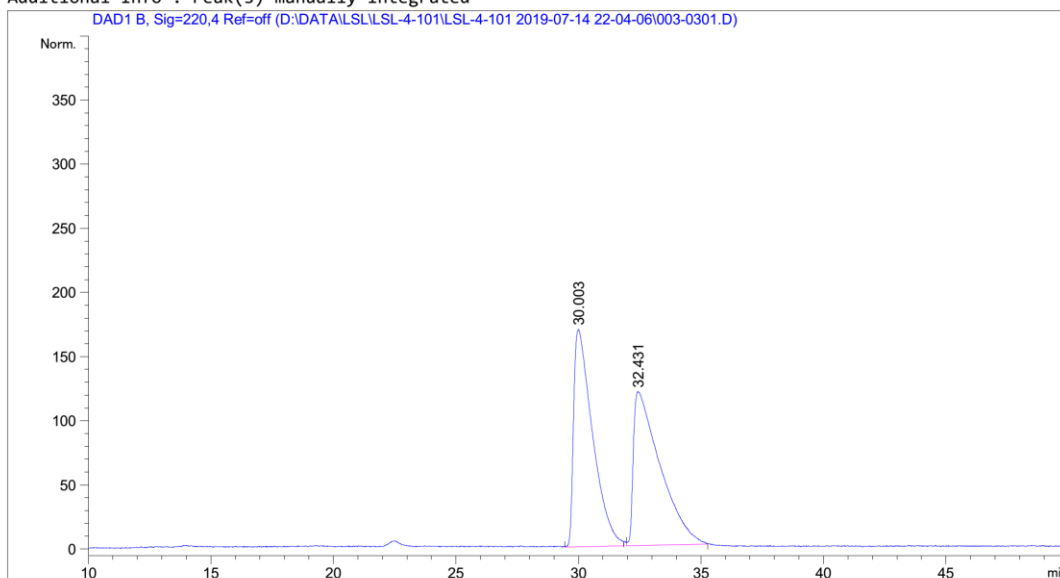
Totals : 9715.78320 564.75478



Data File D:\DATA\LSL\LSL-4-101\LSL-4-101 2019-07-14 22-04-06\003-0301.D  
Sample Name: LSL-4-101-RAC

```
=====
Acq. Operator   :                               Seq. Line :    3
Acq. Instrument : Instrument 2                  Location  : Vial 3
Injection Date  : 7/14/2019 10:27:20 PM         Inj       :    1
                                           Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-101\LSL-4-101 2019-07-14 22-04-06\DAD-OD(1-2)-98-2-1ML-
                    SUL-ALL-40MIN.M
Last changed    : 7/14/2019 10:52:50 PM
                    (modified after loading)
Analysis Method : D:\METHOD\LYH\DAD-OD(1-2)-98-2-0.5ML-5UL-ALL-60MIN.M
Last changed    : 7/15/2019 8:44:13 AM
                    (modified after loading)
Additional Info  : Peak(s) manually integrated
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

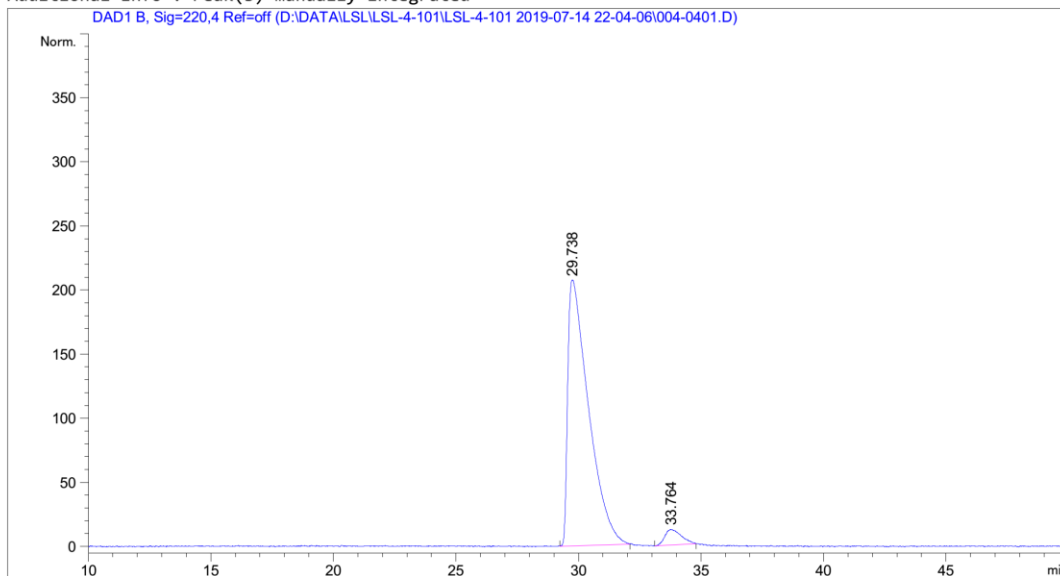
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	30.003	VV	0.6380	9079.20801	169.20441	50.0814
2	32.431	VB	0.8874	9049.70410	120.05280	49.9186

Totals :                      1.81289e4    289.25721

Data File D:\DATA\LSL\LSL-4-101\LSL-4-101 2019-07-14 22-04-06\004-0401.D  
Sample Name: LSL-4-101

```
=====
Acq. Operator   :                               Seq. Line :    4
Acq. Instrument : Instrument 2                   Location  : Vial 4
Injection Date  : 7/14/2019 11:28:19 PM          Inj       :    1
                                                Inj Volume : 5.000 µl

Acq. Method     : D:\DATA\LSL\LSL-4-101\LSL-4-101 2019-07-14 22-04-06\DAD-OD(1-2)-98-2-1ML-
                  SUL-ALL-40MIN.M
Last changed    : 7/14/2019 10:52:50 PM
                  (modified after loading)
Analysis Method : D:\METHOD\LYH\DAD-OD(1-2)-98-2-0.5ML-5UL-ALL-60MIN.M
Last changed    : 7/15/2019 8:44:13 AM
                  (modified after loading)
Additional Info : Peak(s) manually integrated
```



Area Percent Report

```
Sorted By      :      Signal
Multiplier     :      1.0000
Dilution       :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: DAD1 B, Sig=220,4 Ref=off

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	29.738	VB	0.7459	1.22027e4	207.57225	95.5289
2	33.764	BB	0.5533	571.13190	12.26329	4.4711

Totals :                    1.27738e4   219.83554