

## Electronic Supplementary Information

**The Organocatalyzed Domino Michael-Aldol Reaction Revisited. Synthesis of Enantioenriched 3-Hydroxycyclohexanone Derivatives by Reaction of Enals with  $\alpha,\alpha'$ -Diaryl-substituted Acetone.**

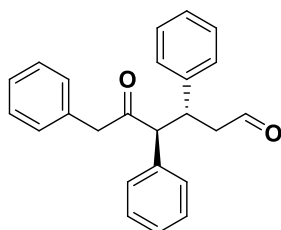
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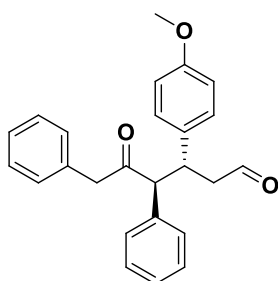
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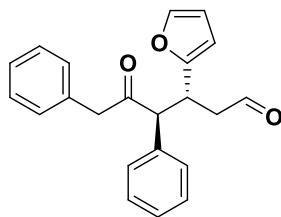
**(3R,4S)-5-Oxo-3,4,6-triphenylhexanal (5aa).** White solid; mp 118.8-121.5 °C (hexane)  $[\alpha]_D^{25} = +50.5$ , ( $c = 1$ ,  $\text{CHCl}_3$ , 46%ee)  $^1\text{H-NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  2.35 (dd,  $J = 16.9$ , 3.0 Hz, 1H), 2.50 (dd,  $J = 14.8$ , 10.2 Hz, 1H), 3.38 (q,  $J = 15.7$  Hz, 2H), 4.05 (dd,  $J = 10.1$ , 4.1 Hz, 1H), 4.13 (d,  $J = 11.1$  Hz, 1H), 6.71 (d,  $J = 6.3$  Hz, 2H), 7.55 – 7.17 (m, 13H), 9.33 (s, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$ , 42.8, 47.7, 50.4, 62.9, 126.0, 127.1, 128.2, 128.3, 128.7, 2C(128.8), 2C(128.9), 2C(129.2), 2C(129.4), 2C(129.6), 133.3, 136.0, 141.7, 200.9, 205.9; **HPLC** (Chiralpak AD-H hexane/iPrOH = 97:3, 0.7 mL/min,  $\lambda = 220$  nm)  $t_R = 32.7$  min (major),  $t_R = 35.2$  min (minor); **IR** 3055.1, 3028.4, 1704.5, 1491.0, 1453.6, 700.9. **HRMS**  $\text{C}_{24}\text{H}_{23}\text{O}_2$  (M+H), Calc: 343.1693, Found: 343.1692.



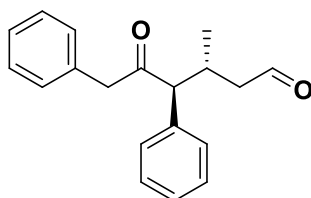
**(3R,4S)-3-(4-Methoxyphenyl)-5-oxo-4,6-diphenylhexanal (5ab)** White solid; mp 82.8-85.2 °C (hexane)  $[\alpha]_D^{25} = +40$ , ( $c = 1$ ,  $\text{CHCl}_3$ , 38%ee)  $^1\text{H-NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  2.33 (s, 1H), 2.46 (s, 1H), 3.39 (s, 2H), 3.80 (s, 3H), 4.00 (s, 1H), 4.08 (s, 1H), 6.76 (d,  $J = 8.4$  Hz, 2H), 7.22 (dd,  $J = 90.9$ , 29.6 Hz, 12H), 9.33 (s, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{cdcl}_3$ )  $\delta$  42.0, 47.7, 50.5, 55.4, 63.2, 2C(114.2), 127.0, 127.2, 128.23, 128.7, 128.9, 129.1, 129.2, 129.3, 2C(129.6), 2C(129.7), 133.3, 133.6, 136.1, 158.5, 201.1, 206.0; **HPLC** (Chiralpak AD-H hexane/iPrOH) =90:10, 1 mL/min,  $\lambda = 220$  nm)  $t_R = 15.6$  min (minor),  $t_R = 20.2$  min (major); **IR** 3023.0, 2905.6, 1715.2, 1512.3, 1496.3, 1250.8, 695.6; **HRMS**  $\text{C}_{25}\text{H}_{25}\text{O}_3$  (M+H), Calc: 373.1798, Found: 373.1798.



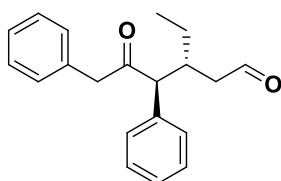
**(3R,4S)-3-(Furan-2-yl)-5-oxo-4,6-diphenylhexanal (5ac).** Colorless oil;  $[\alpha]_D^{25} = +29.0$ , ( $c = 0.9$ ,  $\text{CHCl}_3$ , 26%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  2.24 (ddd,  $J = 16.9$ , 4.1, 1.3 Hz, 1H), 2.41 (ddd,  $J = 16.9$ , 9.4, 2.3 Hz, 1H), 3.44 (s, 2H), 3.93 – 4.15 (m, 1H), 4.17 (d,  $J = 10.7$  Hz, 1H), 5.72 (m, 1H), 6.16 (dd,  $J = 3.2$ , 1.9 Hz, 1H), 6.81 (dd,  $J = 6.8$ , 2.6 Hz, 2H), 7.37 – 6.97 (m, 9H), 9.35 (t,  $J = 1.8$  Hz, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  29.8, 35.8, 45.0, 49.8, 60.2, 107.4, 110.5, 127.1, 128.3, 128.7, 2C(128.9), 129.2, 129.4, 129.7, 133.6, 135.4, 2C(141.5), 154.4, 200.5, 205.9; **HPLC** (Chiralpak AD-H hexane/iPrOH = 95:5, 1 mL/min,  $\lambda = 220$  nm)  $t_R = 16.1$  min (major),  $t_R = 18.3$  min (minor); **IR** 3066, 3029, 2928.1, 2731.8, 1713, 1495.4, 1017, 699; **HRMS**  $\text{C}_{22}\text{H}_{21}\text{O}_3$  (M+H), Calc: 333.1485, Found: 333.1486.



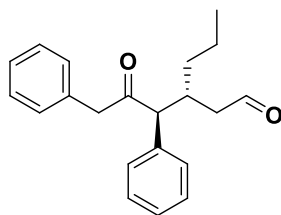
**(3R,4S)-3-Methyl-5-oxo-4,6-diphenylhexanal (5ad).** Colorless oil;  $[\alpha]_D^{25} = +69.5$ , ( $c = 1$ ,  $\text{CHCl}_3$ , 43%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  0.89 (d,  $J = 6.4$  Hz, 3H), 1.94 (dd,  $J = 16.6$ , 8.8 Hz, 1H), 2.85 (s, 1H), 2.24 – 2.06 (m, 1H), 3.40 – 3.72 (m, 3H), 6.64–7.51 (m, 10H), 9.45 (s, 1H);  $^{13}\text{C-NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  19.2, 30.9, 48.2, 50.1, 63.3, 127.2, 128.0, 2C(128.8), 2C(129.2), 2C(129.3), 2C(129.7), 133.8, 136.6, 201.7, 206.7; **HPLC** (Chiralpak AD-H hexane/iPrOH = 97:3, 0.7 mL/min  $\lambda = 220$  nm)  $t_R = 17.2$  min (major),  $t_R = 18.5$  min (minor); **IR** 3034.2, 2965.2, 2922.8, 2721.2, 1713, 1453, 699. **HRMS**  $\text{C}_{19}\text{H}_{21}\text{O}_2$  (M+H), Calc: 281.1536, Found: 281.1536.



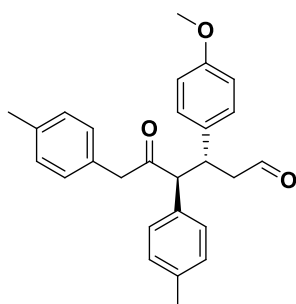
**(3R,4S)-3-Ethyl-5-oxo-4,6-diphenylhexanal (5ae).** Colorless oil;  $[\alpha]_D^{25} = +64.5$ , ( $c = 1.2$ ,  $\text{CHCl}_3$ , 39%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  0.69 (t,  $J = 7.5$  Hz, 3H), 1.11 – 1.46 (m, 2H), 1.97 (ddd,  $J = 17.0$ , 6.9, 2.2 Hz, 1H), 2.12 (ddd,  $J = 17.0$ , 5.1, 1.8 Hz, 1H), 2.70 (ddd,  $J = 9.9$ , 7.2, 3.7 Hz, 1H), 3.55 (d,  $J = 3.0$  Hz, 2H), 3.77 (d,  $J = 10.1$  Hz, 1H), 6.68 – 7.53 (m, 10H), 9.31 (t,  $J = 2.0$  Hz, 1H);  $^{13}\text{C-NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  10.9, 25.5, 37.0, 44.8, 50.1, 61.0, 127.2, 128.1, 2C(128.8), 2C(129.3), 2C(129.4), 2C(129.7), 133.8, 136.5, 201.8, 207.0; **HPLC** (Chiralcel OD hexane/iPrOH = 97:3, 0.5 mL/min  $\lambda = 220$  nm)  $t_R = 22.3$  min (minor),  $t_R = 25.1$  min (major); **IR** 3066, 2965.2, 2726.5, 1713, 1453, 1277.8, 699; **HRMS**  $\text{C}_{20}\text{H}_{23}\text{O}_2$  (M+H), Calc: 295.1693, Found: 295.1696.



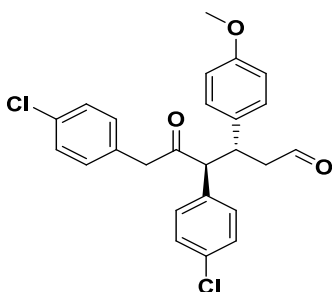
**(3R,4S)-5-Oxo-4,6-diphenyl-3-propylhexanal (5af).** Colorless oil;  $[\alpha]_D^{25} = +50.3$ , ( $c = 1$ ,  $\text{CHCl}_3$ , 32%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  0.73 (dd,  $J = 8.8$ , 5.2 Hz, 3H), 0.95 – 1.31 (m, 4H), 1.96 (ddd,  $J = 17.1$ , 6.7, 2.2 Hz, 1H), 2.13 (ddd,  $J = 17.1$ , 5.1, 1.8 Hz, 1H), 2.55 – 2.98 (m, 1H), 3.30 – 3.67 (m, 2H), 3.78 (d,  $J = 10.1$  Hz, 1H), 6.76 – 7.59 (m, 10H), 9.31 (t,  $J = 2.0$  Hz, 1H);  $^{13}\text{C-NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  14.2, 19.9, 35.2, 35.6, 45.3, 50.1, 61.4, 127.2, 128.1, 128.3, 128.8, 2C(129.4), 2C(129.6), 2C(129.7), 133.8, 136.5, 201.8, 207.0; **HPLC** (Chiralcel OD hexane/iPrOH = 97:3, 0.5 mL/min  $\lambda = 220$  nm)  $t_R = 20.2$  min (minor),  $t_R = 22.5$  min (major); **IR** 3055.6, 2960, 2726, 1713, 1453, 699; **HRMS**  $\text{C}_{21}\text{H}_{25}\text{O}_2$  (M+H), Calc: 309.1849, Found: 309.1850.



**(3R,4S)-3-(4-Methoxyphenyl)-5-oxo-4,6-dip-tolylhexanal (5bb).** Colorless oil;  $[\alpha]_D^{25} = +18.4$ , ( $c = 0.9$ ,  $\text{CHCl}_3$ , 46%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  2.33 (m, 7H), 2.43 (ddd,  $J = 16.6, 9.9, 2.7$  Hz, 1H), 3.33 (d,  $J = 4.5$  Hz, 2H), 3.79 (s, 3H), 3.96 (dd,  $J = 10.0, 4.5$  Hz, 1H), 4.03 (d,  $J = 11.1$  Hz, 1H), 6.69 (m, 4H), 7.02 (m, 4H), 7.16 (s, 4H), 9.32 (dd,  $J = 2.6, 1.5$  Hz, 1H);  $^{13}\text{C-NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  2C(21.2), 41.9, 47.8, 49.8, 55.3, 62.7, 2C(114.1), 2C(129.0), 2C(129.2), 2C(129.3), 2C(129.5), 2C(130.0), 130.3, 133.1, 133.7, 136.5, 138.0, 158.5, 201.3, 206.3; **HPLC** (Chiralpak AD-H hexane/iPrOH = 95:5, 0.8 mL/min,  $\lambda = 220$  nm)  $t_R = 34.3$  min (major),  $t_R = 36.5$  min (minor); **IR** 3002.4, 2922.8, 2726.5, 1718.2, 1511.3; **HRMS**  $\text{C}_{27}\text{H}_{29}\text{O}_3$  (M+H), Calc: 401.2111, Found: 401.2115.

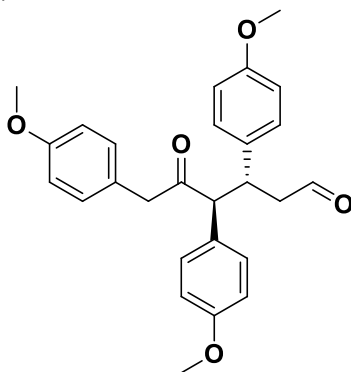


**(3R,4S)-4,6-Bis(4-chlorophenyl)-3-(4-methoxyphenyl)-5-oxohexanal (5cb).** White solid; mp 183-185  $^{\circ}\text{C}$  (hexane)  $[\alpha]_D^{25} = +2.2$ , ( $c = 0.8$ ,  $\text{CHCl}_3$ , 6%ee)  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ )  $\delta$  2.23 (ddd,  $J = 16.8, 4.3, 1.3$  Hz, 1H), 2.41 (ddd,  $J = 16.8, 10.2, 2.5$  Hz, 1H), 3.24 (q,  $J = 15.7$  Hz, 2H), 3.72 (s, 3H), 3.77 – 3.91 (m, 1H), 3.96 (d,  $J = 11.2$  Hz, 1H), 6.31 – 7.60 (m, 12H), 9.27 (dd,  $J = 2.4, 1.3$  Hz, 1H);  $^{13}\text{C-NMR}$  (101 MHz,  $\text{CDCl}_3$ )  $\delta$  29.8, 42.1, 47.4, 49.9, 55.4, 62.7, 2C(114.2), 2C(128.8), 2C(129.2), 2C(129.6), 2C(130.3), 2C(130.9), 131.4, 133.0, 133.1, 134.4, 158.7, 200.6, 205.4; **HPLC** (Chiralpak AD-H hexane/iPrOH = 95:5, 0.8 mL/min,  $\lambda = 220$  nm)  $t_R = 41.5$  min (major),  $t_R = 63.7$  min (minor); **IR** 2960, 2922.8, 2848.5, 2731.8, 1914.6, 1718.2; **HRMS**  $\text{C}_{25}\text{H}_{23}\text{O}_3\text{Cl}_2$  (M+H), Calc: 441.1018, Found: 441.1009.

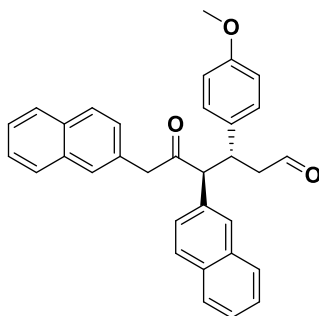


**(3R,4R)-3,4,6-tris(4-methoxyphenyl)-5-oxohexanal (5db).** White solid; mp 121-123  $^{\circ}\text{C}$  (hexane)  $[\alpha]_D^{25} = +7.8$ , ( $c = 0.7$ ,  $\text{CHCl}_3$ , 20%ee)  $^1\text{H-NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  2.32 (ddd,  $J = 16.6, 4.5, 1.5$  Hz, 1H), 2.43 (ddd,  $J = 16.6, 9.9, 2.7$  Hz, 1H), 3.30 (d,  $J = 3.8$  Hz, 2H), 3.77 (s, 3H), 3.78 (s, 3H), 3.81 (s, 3H), 3.94 (dd,  $J = 10.6, 3.7$  Hz, 1H), 4.00 (d,  $J = 11.1$  Hz, 1H),

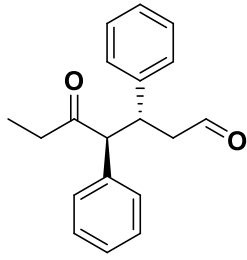
6.39 – 7.41 (m, 12H), 9.32 (dd,  $J = 2.6, 1.5$  Hz, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{CDCl}_3$ ),  $\delta$  41.9, 47.7, 49.3, 2C(55.3), 55.4, 62.0, 2C(113.9), 2C(114.0), 2C(114.6), 125.4, 128, 2C(129.1), 2C(130.2), 2C(130.6), 133.7, 158.4, 158.5, 159.5, 201.2, 206.4; **HPLC** (Chiralpak AD-H hexane/*i*PrOH = 80:20, 1.0 mL/min  $\lambda = 220$  nm)  $t_R = 23.8$  min (major),  $t_R = 20.1$  min (minor); **IR**. 2925, 2832, 2728, 1716, 1616, 1509, 1245, 1178, 1034, 811  $\text{cm}^{-1}$  **HRMS**  $\text{C}_{27}\text{H}_{28}\text{O}_5 + \text{Na}^+$ , Calc: 455.1828, Found: 455.1831.



**(3R,4S)-3-(4-Methoxyphenyl)-4,6-di(naphthalen-2-yl)-5-oxohexanal (5eb)**. White solid; mp 170-172  $^{\circ}\text{C}$  (hexane)  $[\alpha]_D^{25} = -14.7$ , ( $c = 0.8$ ,  $\text{CHCl}_3$ , 38%ee)  $^1\text{H-NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  2.29 (dd,  $J = 16.8, 4.0$  Hz, 1H), 2.47 (m, 1H), 3.58 (s, 2H), 3.74 (d,  $J = 1.4$  Hz, 3H), 4.11 (m, 1H), 4.31 (d,  $J = 11.2$  Hz, 1H), 6.66 (m, 2H), 6.85 (d,  $J = 8.4$  Hz, 1H), 7.08 (m, 2H), 7.63 (m, 13H), 9.30 (s, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  41.9, 47.7, 50.6, 55.3, 63.2, 2C(114.0), 125.9, 126.2, 126.5, 126.7, 127.6, 2C(127.7), 127.8, 2C(127.9), 128.3, 128.5, 128.6, 128.7, 129.2, 129.3, 130.8, 132.5, 133.1, 133.4, 2C(133.5), 133.7, 158.5, 201.1, 205.9; **HPLC** (Chiralpak AD-H hexane/*i*PrOH = 90:10, 1 mL/min,  $\lambda = 220$  nm)  $t_R = 38.9$  min (minor),  $t_R = 56.7$  min (major); **IR** 3055, 2928, 2726, 1707, 1511, 1251; **HRMS**  $\text{C}_{33}\text{H}_{28}\text{O}_3 + \text{Na}^+$  Calc: 495.1930; Found 495.1923.

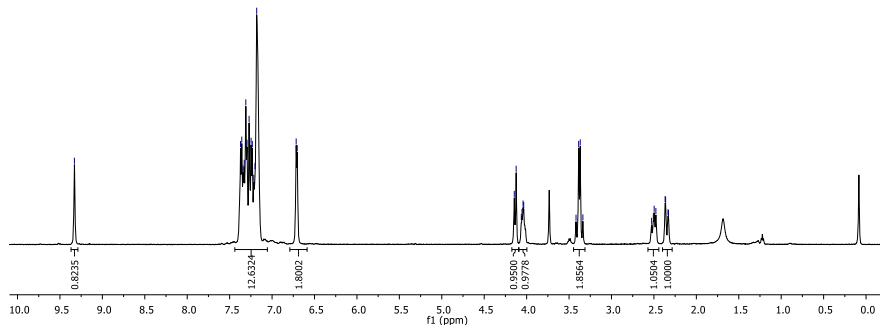
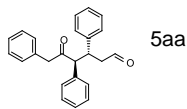


**(3R,4S)-5-Oxo-3,4-diphenylheptanal (5fa)**. White solid; mp 96-98  $^{\circ}\text{C}$  (hexane)  $[\alpha]_D^{25} = -11.5$ , ( $c = 1$ ,  $\text{CHCl}_3$ , 30%ee)  $^1\text{H-NMR}$  (500 MHz,  $\text{CDCl}_3$ )  $\delta$  0.72 (t,  $J = 7.3$  Hz, 3H), 2.02 – 1.95 (m, 1H), 2.35 – 2.28 (m, 1H), 2.44 – 2.37 (m, 1H), 2.60 – 2.52 (m, 1H), 4.08 – 4.03 (m, 2H), 7.21 (dt,  $J = 5.5, 4.0$  Hz, 1H), 7.27 (d,  $J = 0.5$  Hz, 1H), 7.32 – 7.29 (m, 4H), 7.33 (d,  $J = 4.4$  Hz, 1H), 7.36 (s, 2H), 7.37 (s, 1H), 9.37 (dd,  $J = 2.5, 1.6$  Hz, 1H);  $^{13}\text{C-NMR}$  (126 MHz,  $\text{CDCl}_3$ )  $\delta$  7.4, 36.7, 42.6, 47.6, 64.1, 2C(127.0), 128.0, 128.2, 128.3, 128.5, 128.7, 128.8, 128.9, 129.2, 136.2, 141.8, 200.8, 209.3; **HPLC** (Chiralcel OJ-H hexane/*i*PrOH = 95:5, 1.0 mL/min  $\lambda = 220$  nm)  $t_R = 25.8$  min (minor),  $t_R = 28.7$  min (major); **IR** 3033.8, 2937.7, 1709.8, 1496.3, 1453.6, 695.6. **HRMS**  $\text{C}_{19}\text{H}_{20}\text{O}_2 + \text{Na}^+$ , Calc: 303.1355, Found: 303.1364



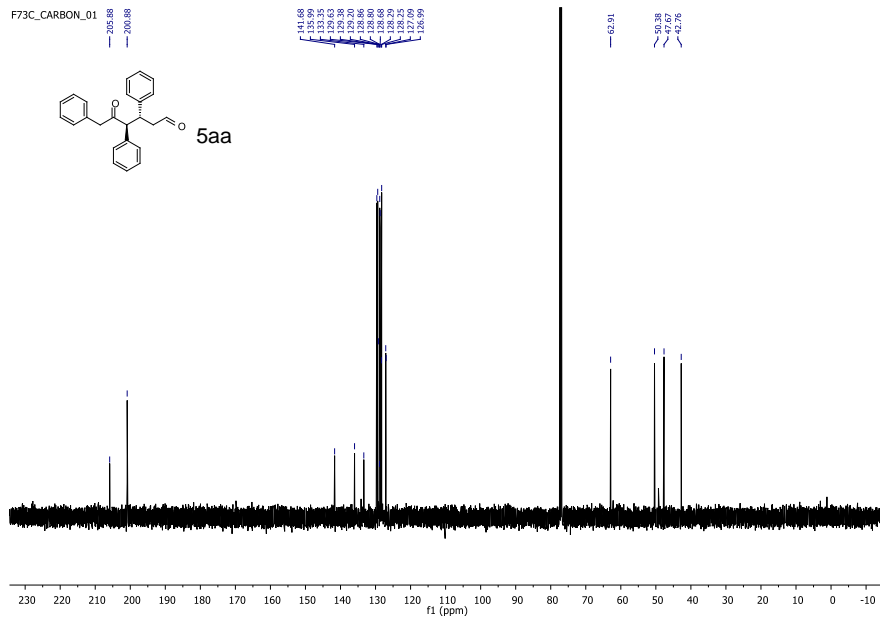
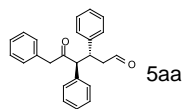
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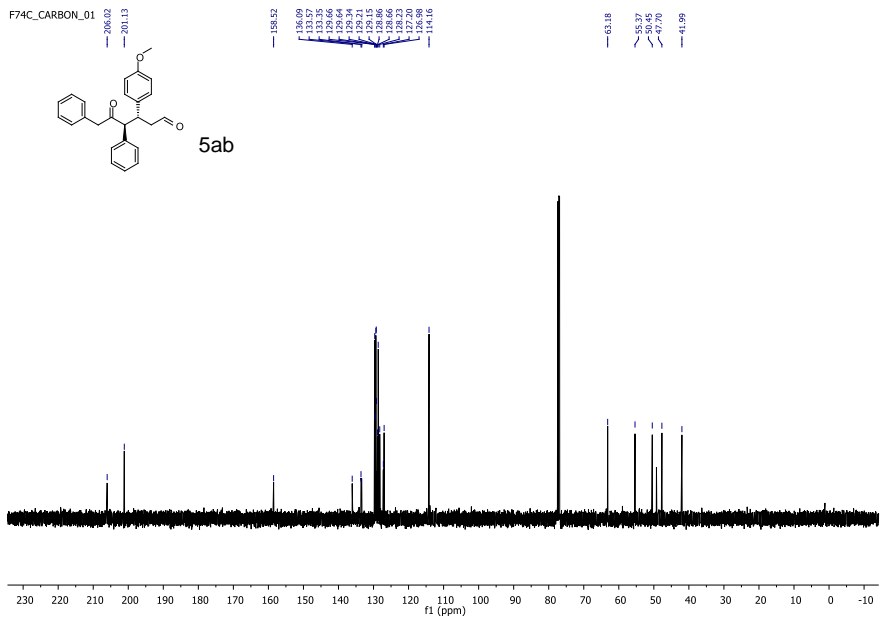
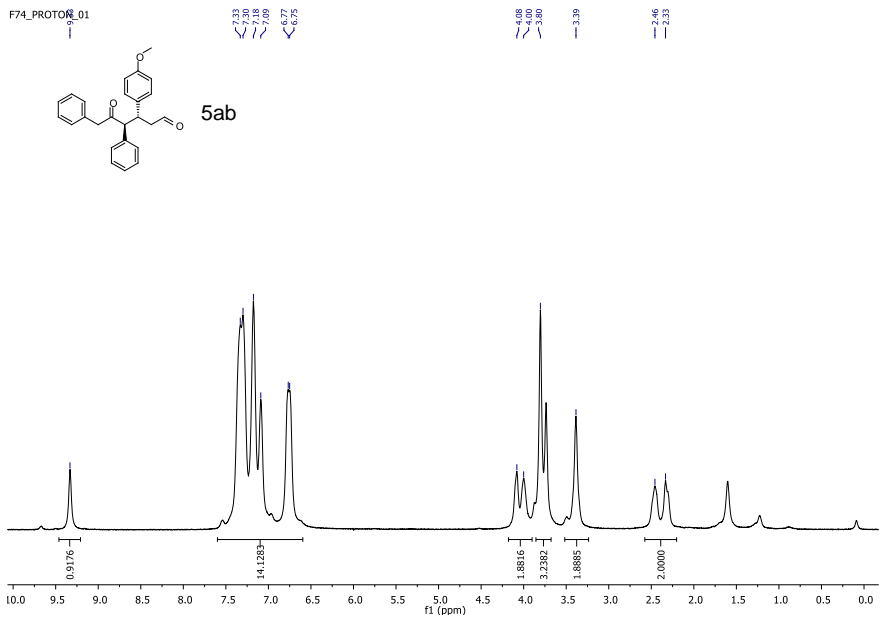
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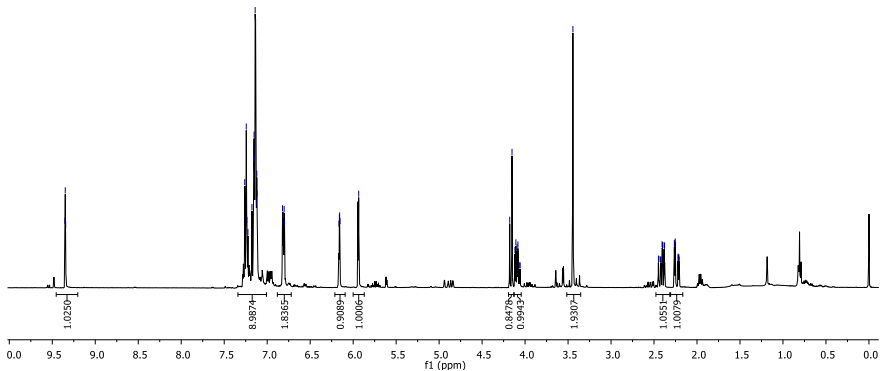
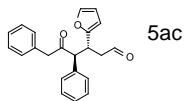






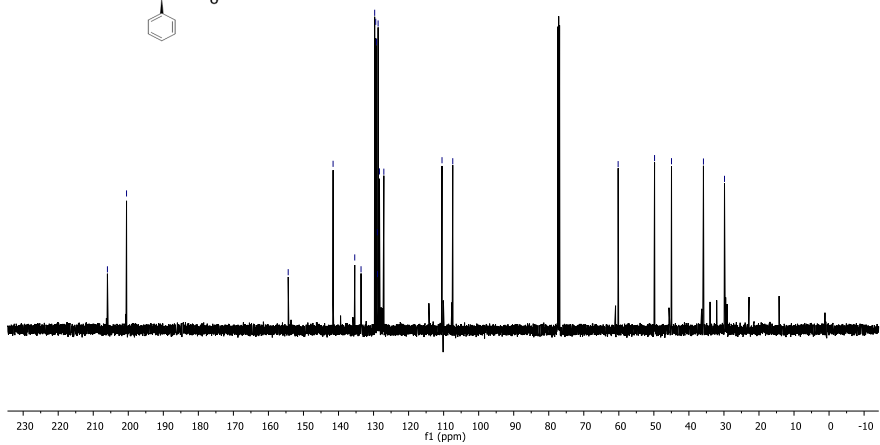
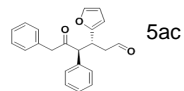
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7.24  
7.24  
7.24  
7.18  
7.18  
7.18  
7.15  
7.15  
7.15  
7.14  
7.13  
7.12  
7.12  
6.82  
6.80  
6.80  
6.17  
6.16  
6.15  
5.94  
4.18  
4.12  
4.11  
4.08  
4.07  
3.44  
2.45  
2.44  
2.42  
2.40  
2.38  
2.36  
2.35  
2.32  
2.22  
2.21



j989-1\_CARBON\_01  
j989-1

205.55  
200.50  
154.36  
141.55  
135.37  
133.57  
129.38  
129.16  
128.70  
127.86  
127.66  
107.39  
60.20  
49.80  
44.97  
38.85  
29.84



j982\_PROTON\_01  
j982

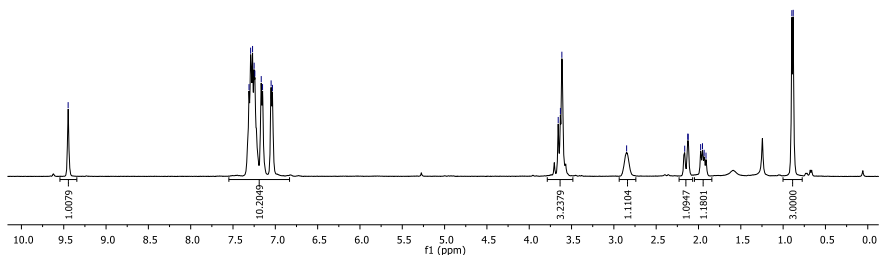
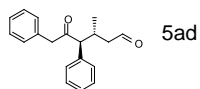
7.31  
7.29  
7.27  
7.24  
7.22  
7.15  
7.05  
7.03

3.66  
3.63  
3.61

2.85

1.16  
1.13  
1.12  
1.09  
1.05  
1.03

0.90  
0.88



j982\_CARBON\_01  
j982

205.75  
201.74

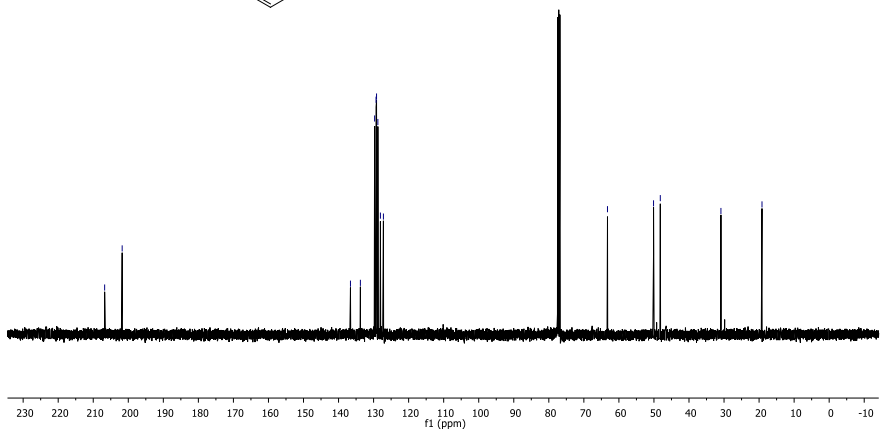
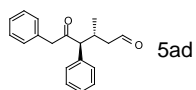
136.69  
133.77  
129.71  
129.16  
128.98  
127.20

63.26

30.12  
28.59

30.89

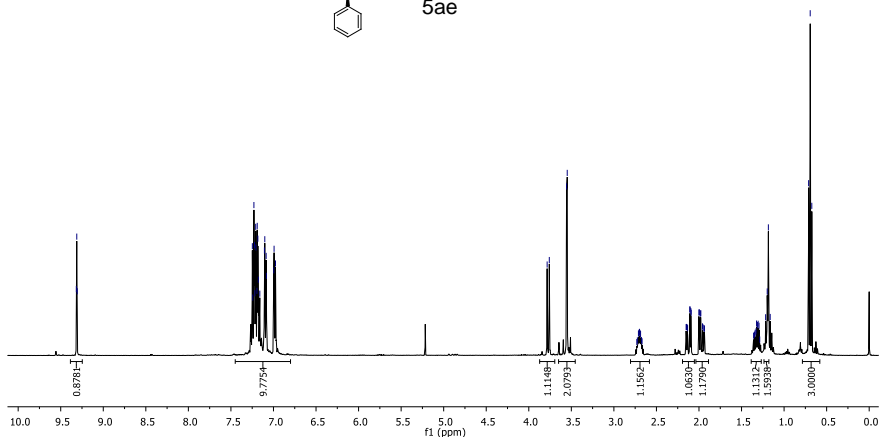
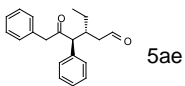
16.17



j984\_PROTONS\_01  
j984

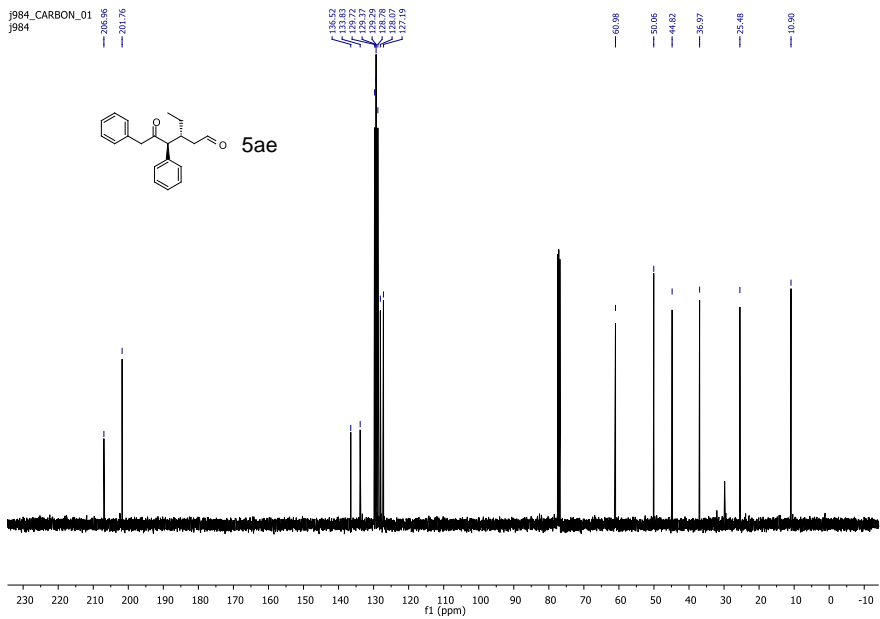
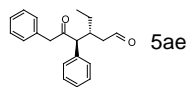
7.24  
7.24  
7.23  
7.23  
7.22  
7.22  
7.21  
7.21  
7.19  
7.18  
7.18  
7.18  
7.10  
7.10  
7.08  
7.08  
6.99  
6.99  
6.98

3.78  
3.56  
3.55  
2.72  
2.71  
2.70  
2.70  
2.69  
2.68  
2.67  
2.10  
2.10  
2.00  
2.00  
1.30  
1.22  
1.18  
1.18  
0.99  
0.99



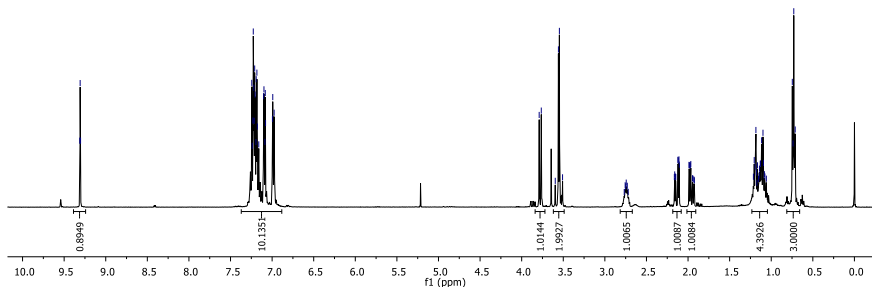
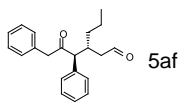
j984\_CARBON\_01  
j984

205.96  
201.76  
134.62  
133.83  
133.72  
129.72  
129.29  
128.78  
128.78  
127.19  
60.98  
50.06  
44.82  
38.97  
25.48  
10.96



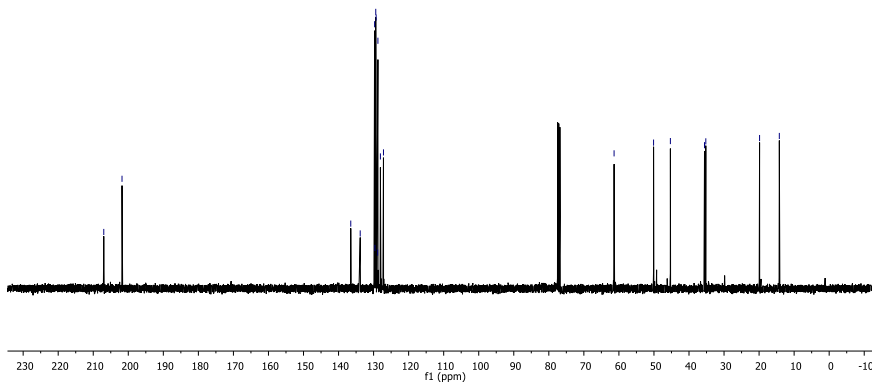
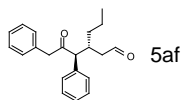
j986\_PROTON\_01  
j986

7.24  
7.23  
7.23  
7.22  
7.22  
7.20  
7.19  
7.18  
7.18  
7.10  
7.08  
7.00  
6.98  
3.79  
3.60  
3.56  
3.55  
3.51  
2.77  
2.76  
2.74  
2.73  
2.72  
2.12  
2.11  
1.99  
1.97  
1.20  
1.18  
1.10  
0.99  
0.74  
0.71



j986\_CARBON\_01  
j986

207.00  
201.79  
136.52  
133.72  
129.63  
129.38  
129.38  
128.95  
128.86  
127.18  
61.38  
50.11  
45.31  
35.98  
35.29  
19.86  
14.22

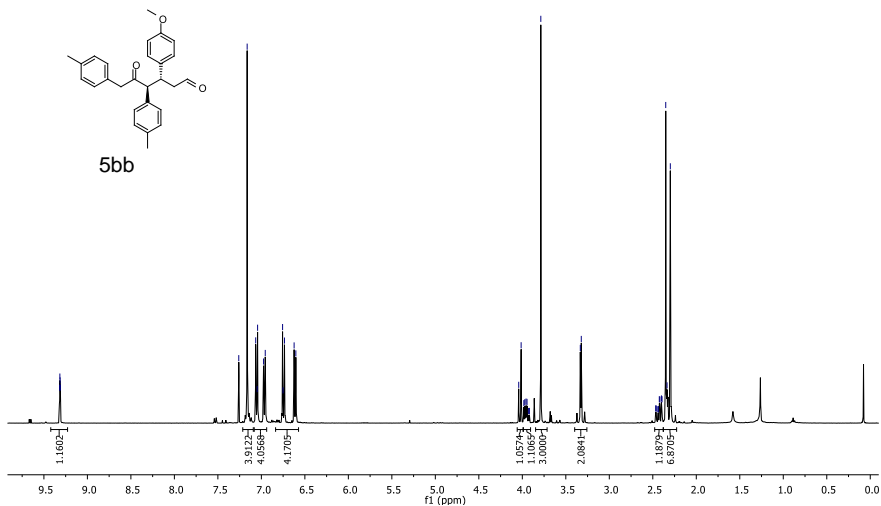
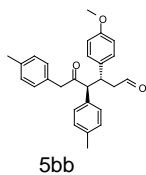


j996\_PROTON\_01  
j996

7.26  
7.06  
7.05  
6.97  
6.96  
6.83  
6.75  
6.62  
6.60

4.04  
4.01  
3.97  
3.96  
3.83  
3.82  
3.79  
3.72

2.47  
2.46  
2.44  
2.43  
2.40  
2.39  
2.34  
2.30



j996\_CARBON\_01  
j996

208.27  
201.31

158.47

132.98  
136.40  
133.74  
133.34  
130.34  
130.01  
129.32  
129.05  
128.65

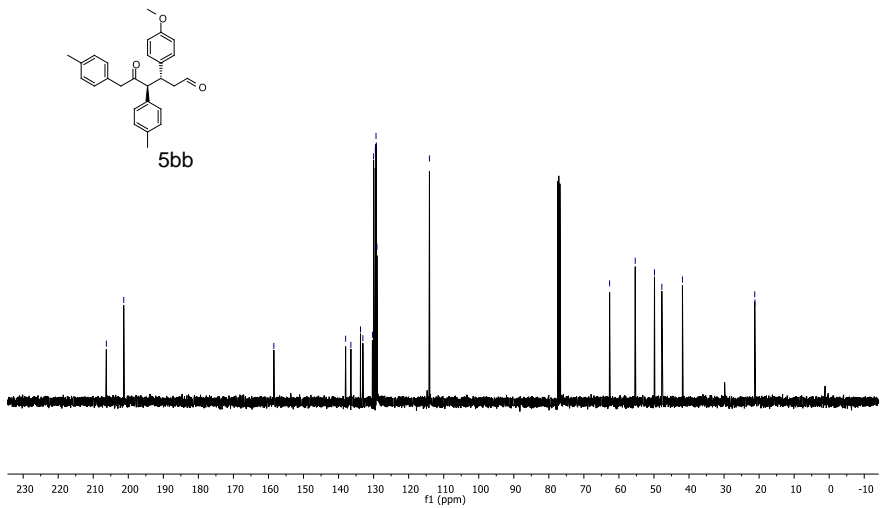
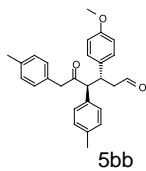
114.07

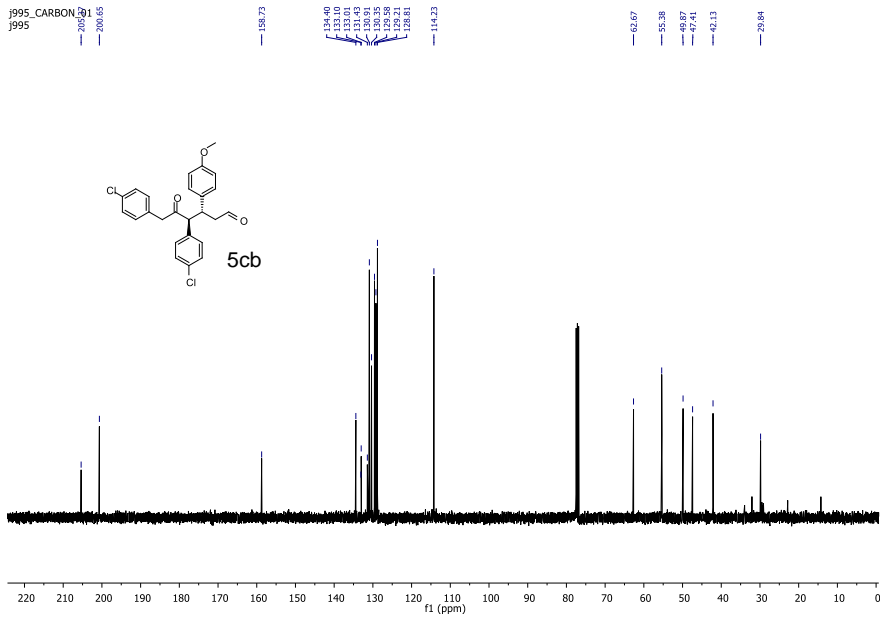
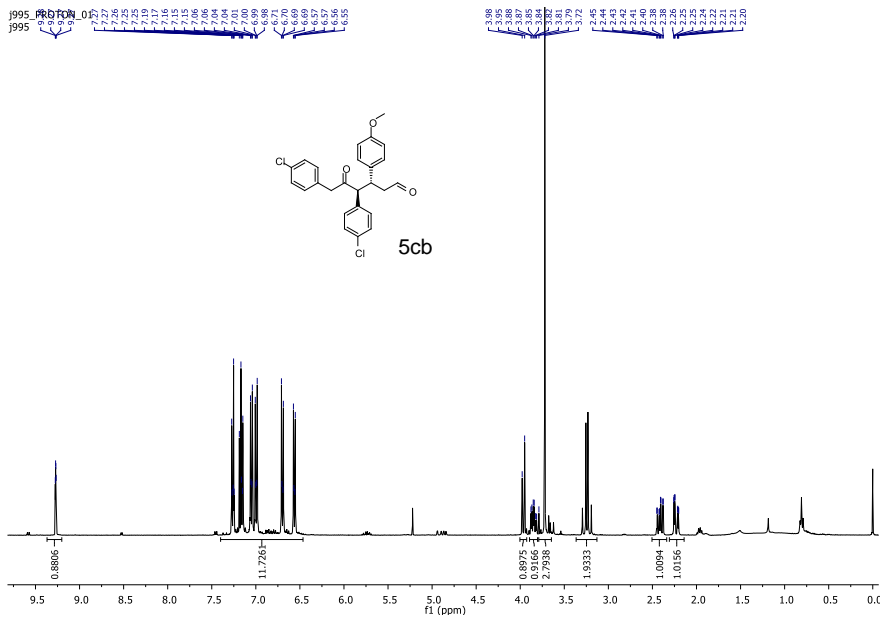
65.66

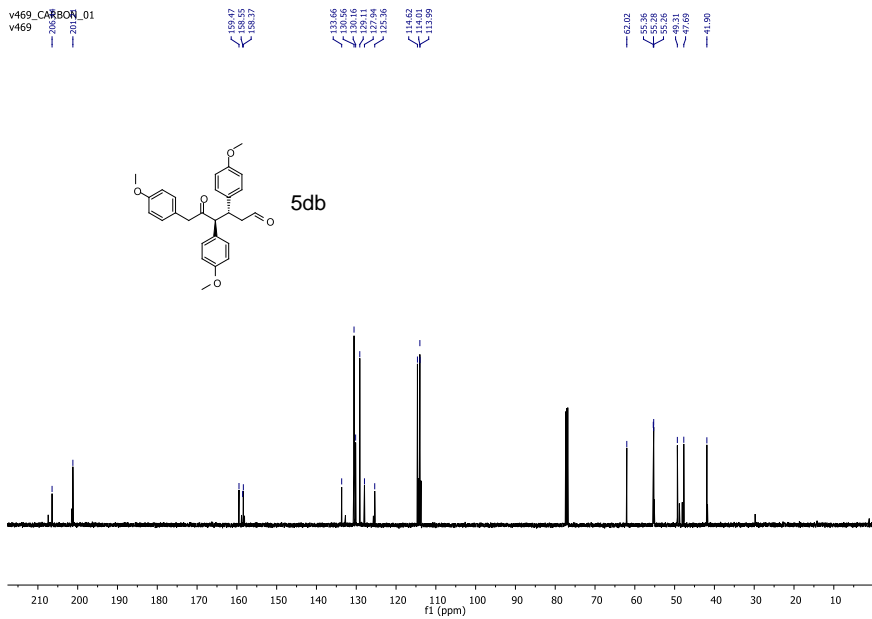
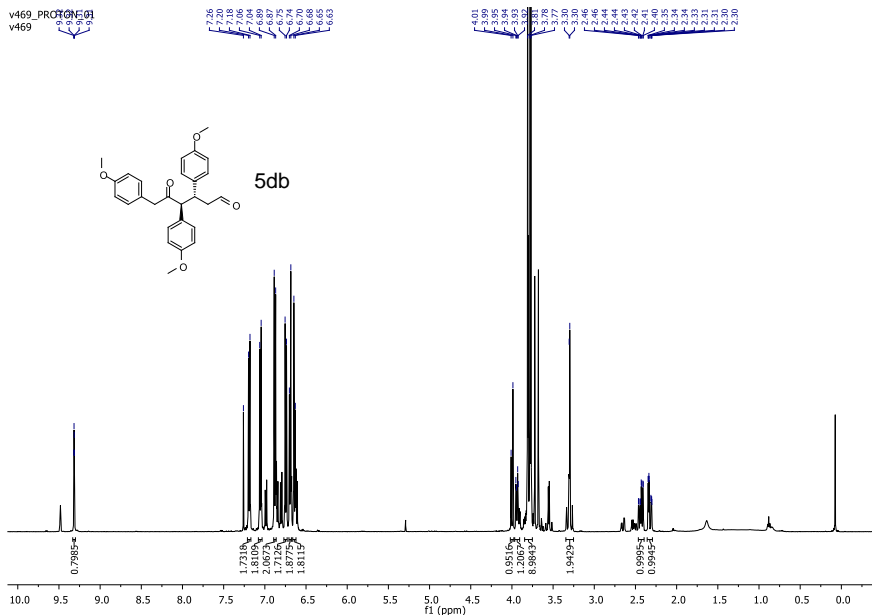
58.34  
47.76

41.87

21.24  
21.19



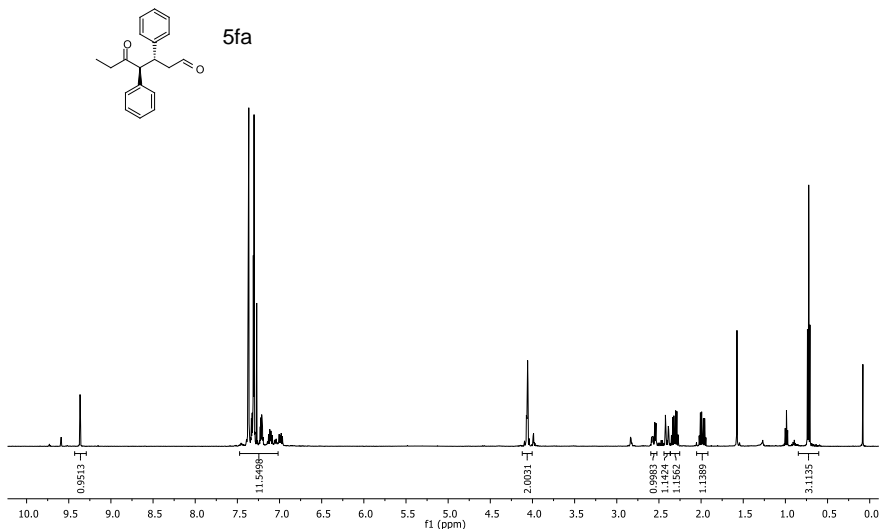




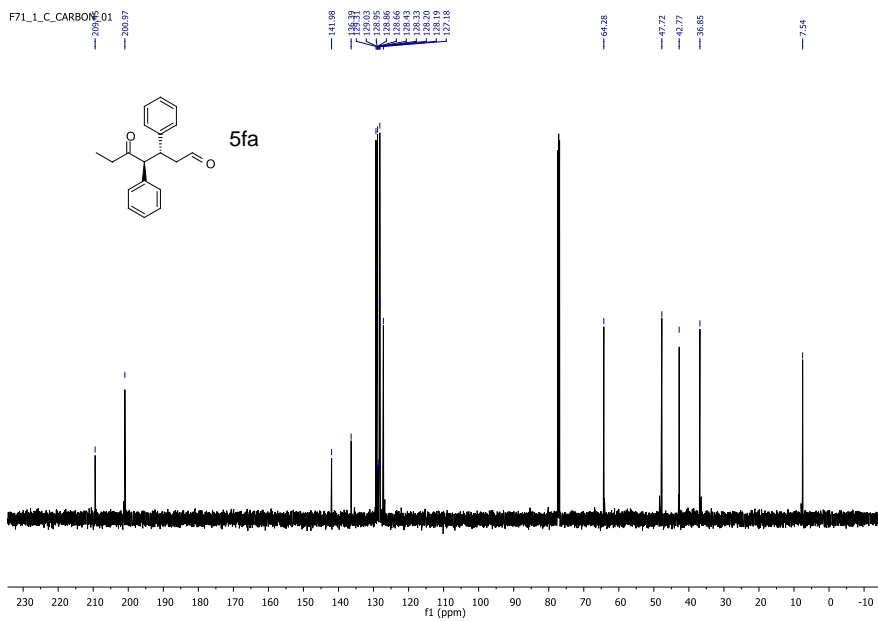


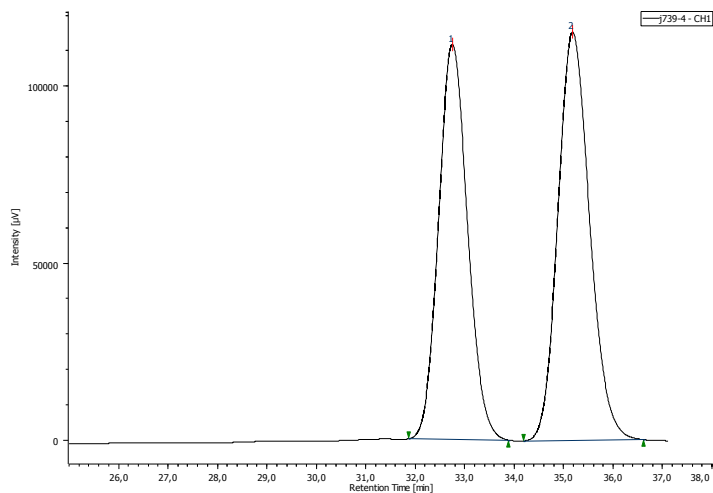
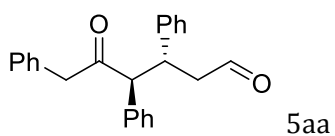


F71\_1\_PROTON\_01

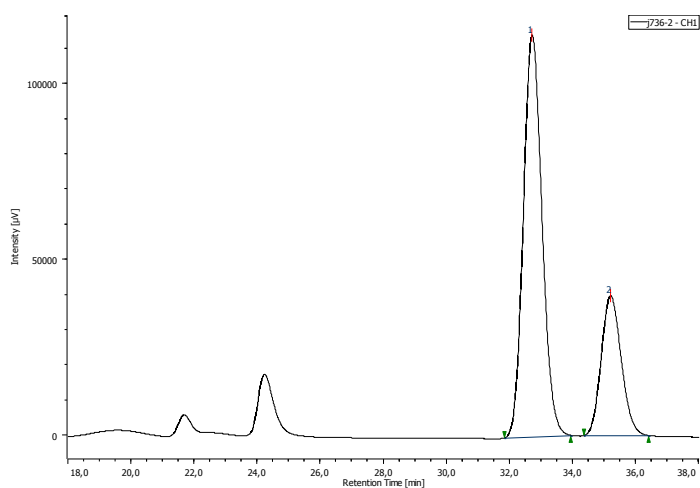


F71\_1\_CARBONE 01

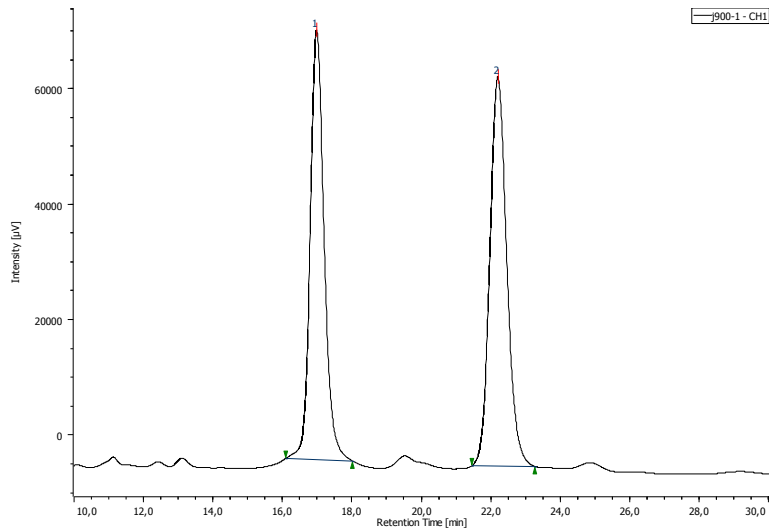
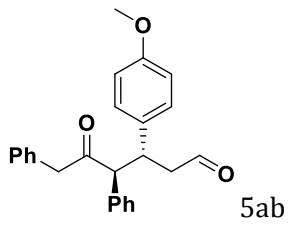




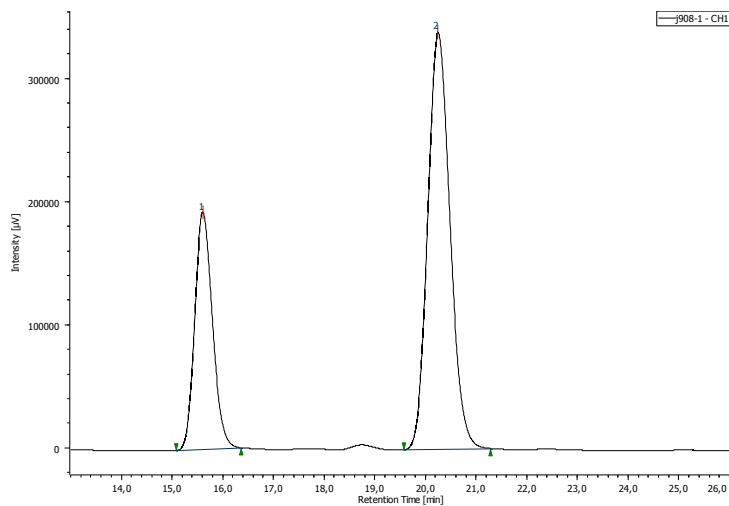
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	32,742	4526233	111394	46,887	49,183	14866	2,166	1,102
2	35,167	5127235	115096	53,113	50,817	14436	N/A	1,159



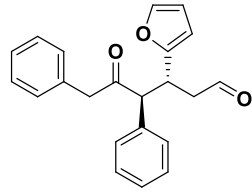
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	32,708	4679736	113972	72,812	74,186	14588	2,221	1,121
2	35,200	1747448	39657	27,188	25,814	14563	N/A	1,125



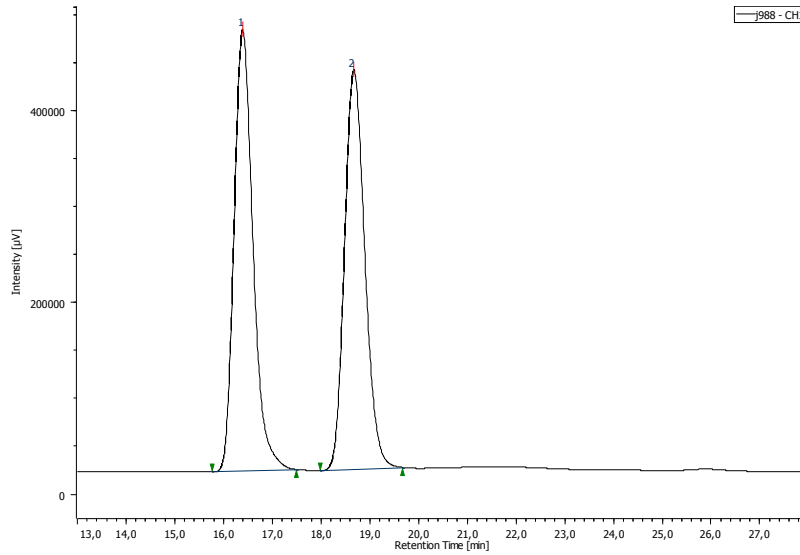
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,975	2070435	74274	47,621	52,444	9296	6,616	1,180
2	22,192	2277255	67352	52,379	47,556	10244	N/A	1,132



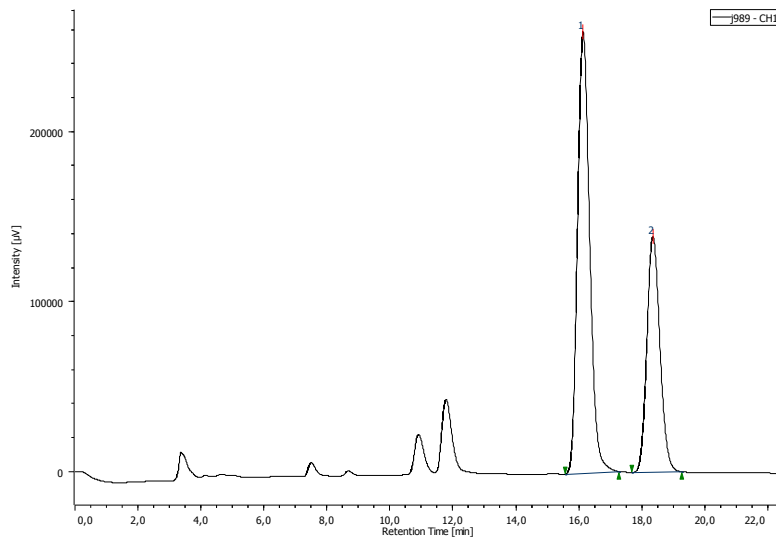
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	15,608	4651160	192279	31,143	36,253	9632	6,467	1,162
2	20,242	10283907	338104	68,857	63,747	10229	N/A	1,137



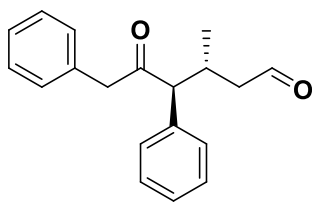
5ac



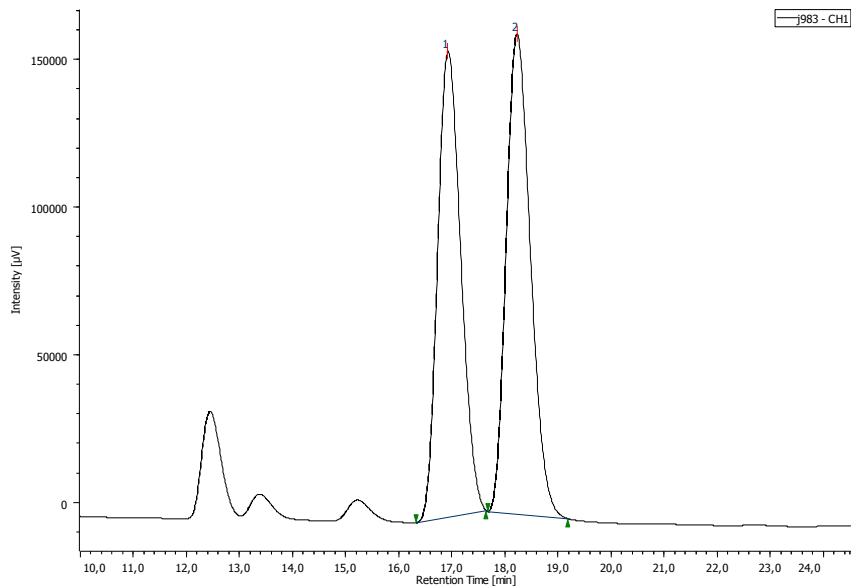
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,383	12332352	459790	50,724	52,506	9060	3,167	1,290
2	18,667	11980391	415901	49,276	47,494	9718	N/A	1,173



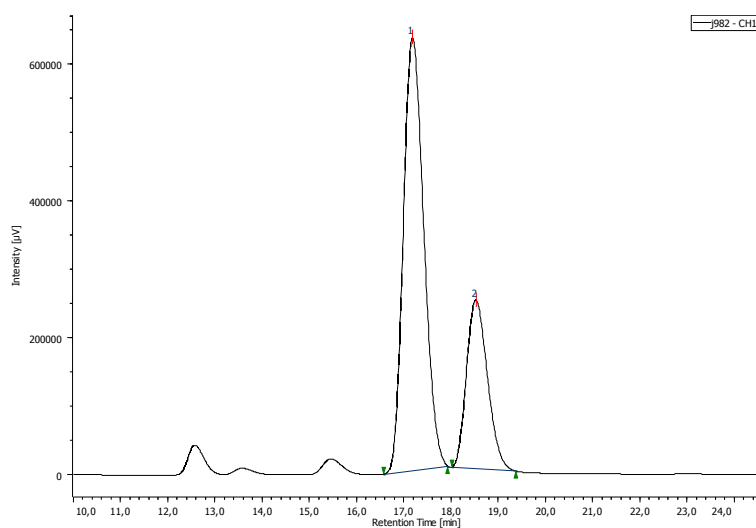
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,117	6920367	259013	63,475	65,172	8580	3,056	1,198
2	18,333	3982088	138415	36,525	34,828	9349	N/A	1,154



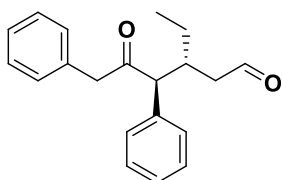
5ad



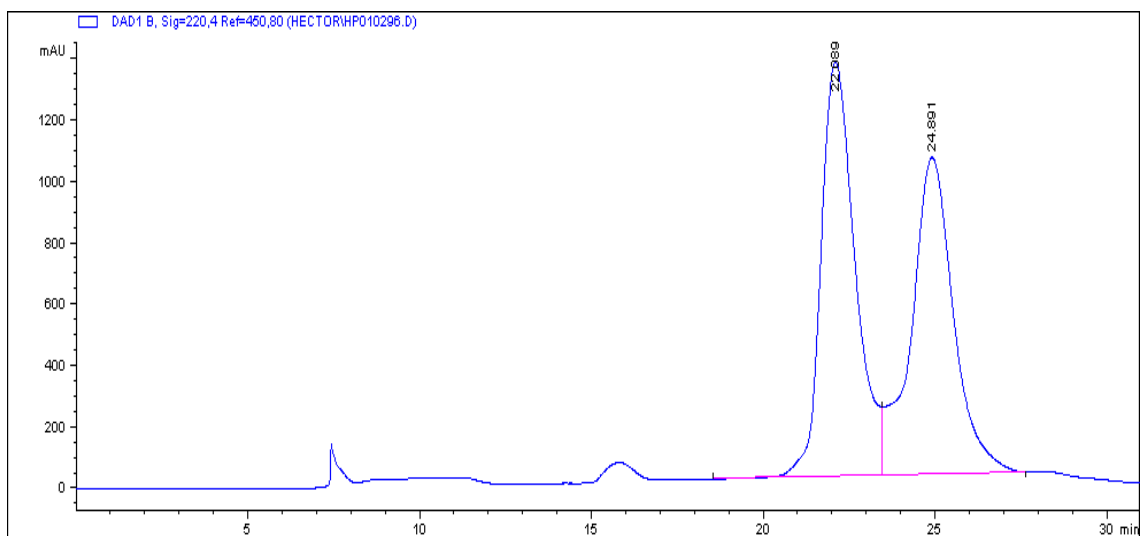
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,917	4761603	157438	48,206	49,263	6934	1,577	1,195
2	18,217	5115962	162152	51,794	50,737	7517	N/A	1,232



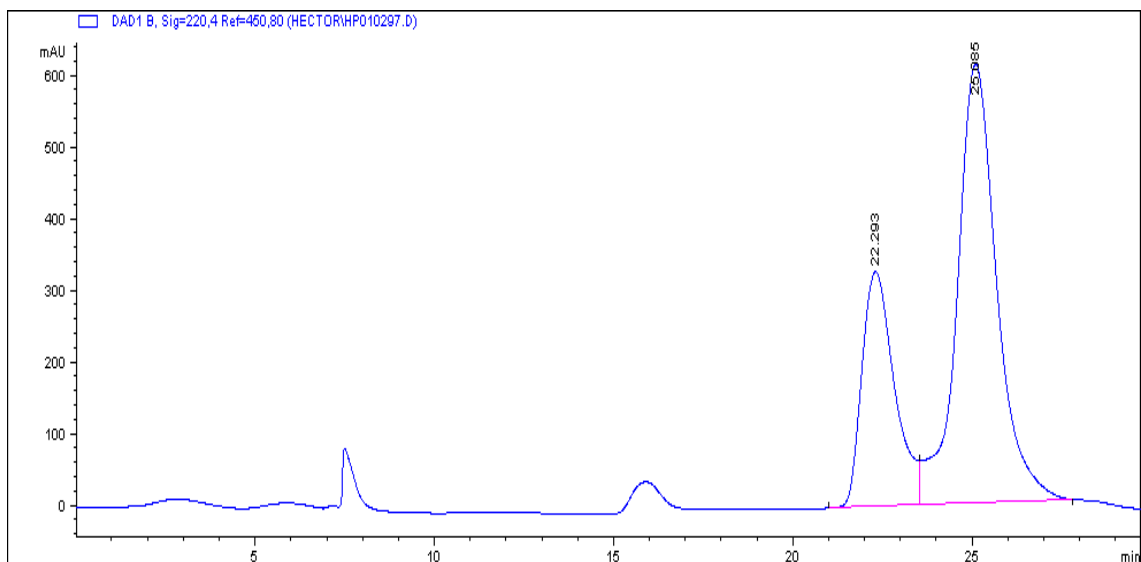
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	17,175	18972461	631917	71,463	72,002	7308	1,653	1,194
2	18,517	7576319	245726	28,537	27,998	8070	N/A	1,222



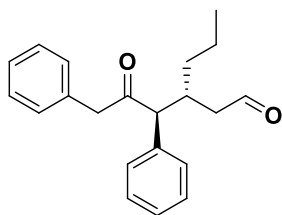
5ae



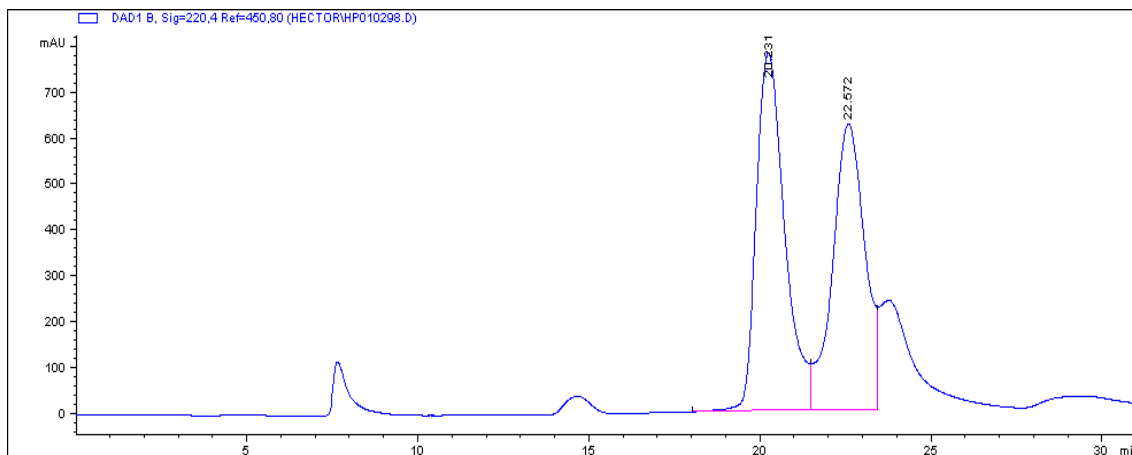
#	Time	Area	Height	Width	Area%	Symmetry
1	22.089	93484.1	1350.3	0.8269	51.408	0.713
2	24.891	88364	1033	1.0523	48.592	0.893



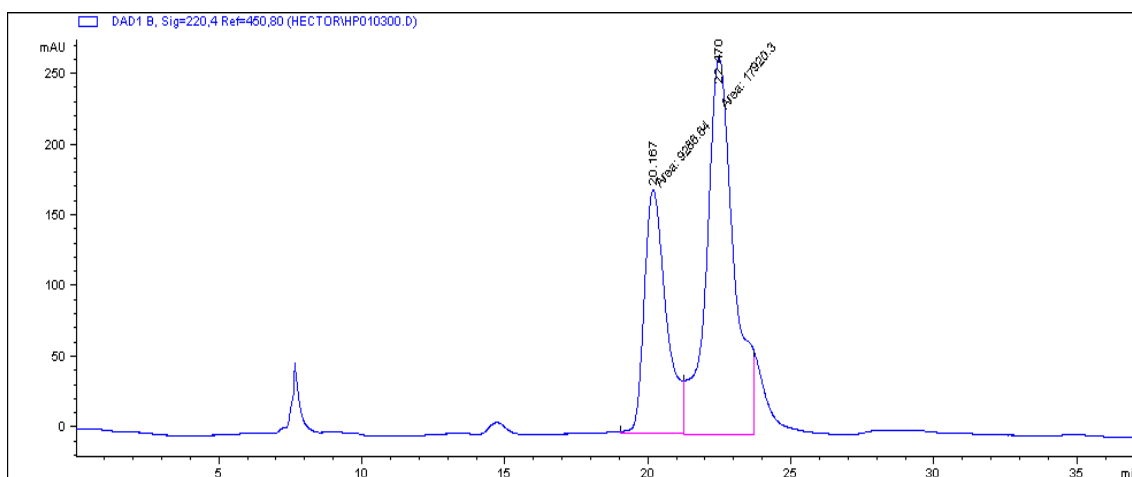
#	Time	Area	Height	Width	Area%	Symmetry
1	22.293	20807.5	328	0.9289	30.569	0.67
2	25.085	47259.4	612.7	1.1079	69.431	0.857



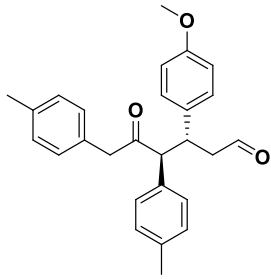
**5af**



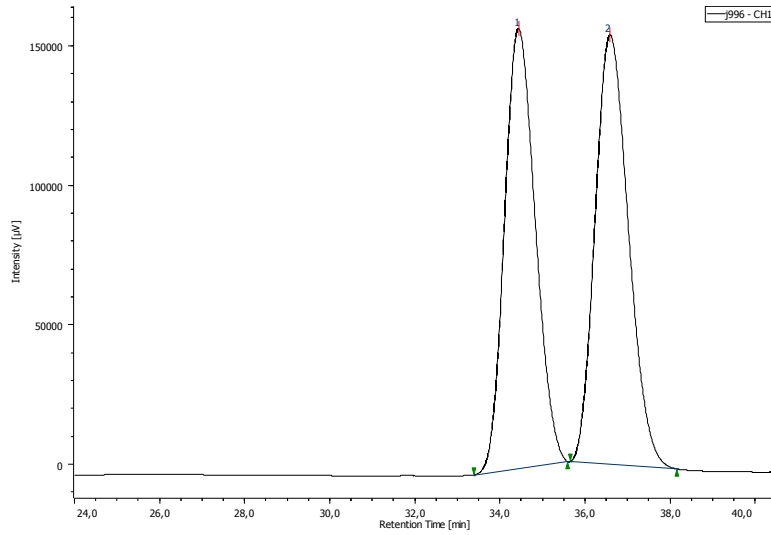
#	Time	Area	Height	Width	Area%	Symmetry
1	20.231	45188.6	778.7	0.8818	52.516	0.698
2	22.572	40858.2	621.4	0.9495	47.484	0.966



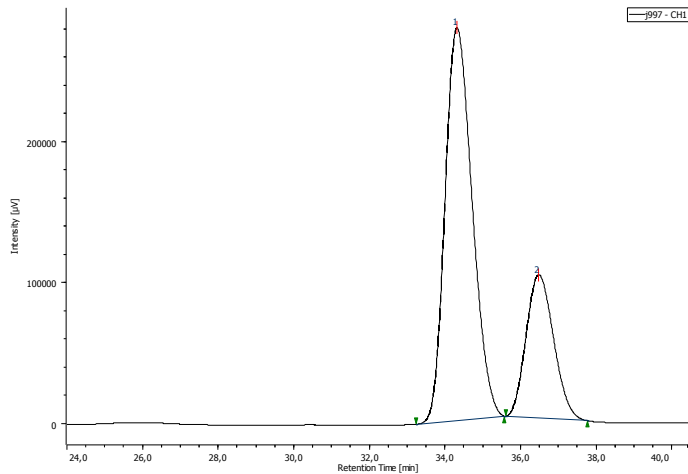
#	Time	Area	Height	Width	Area%	Symmetry
1	20.167	9286.6	172.4	0.8976	34.133	0.654
2	22.47	17920.3	267.2	1.1176	65.867	0.838



5bb

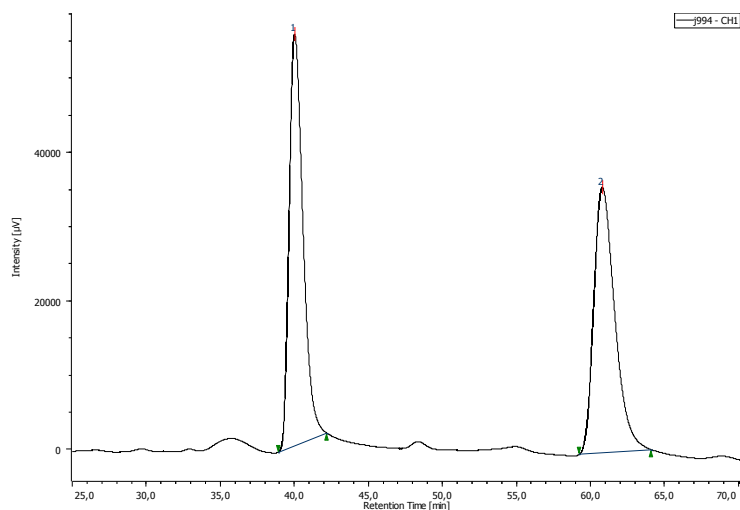
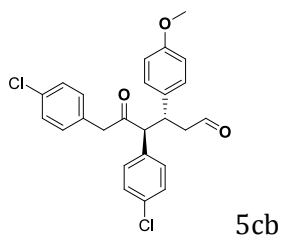


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	34,425	7881141	157333	48,525	50,603	10485	1,540	1,148
2	36,575	8360392	153584	51,475	49,397	10103	N/A	1,194

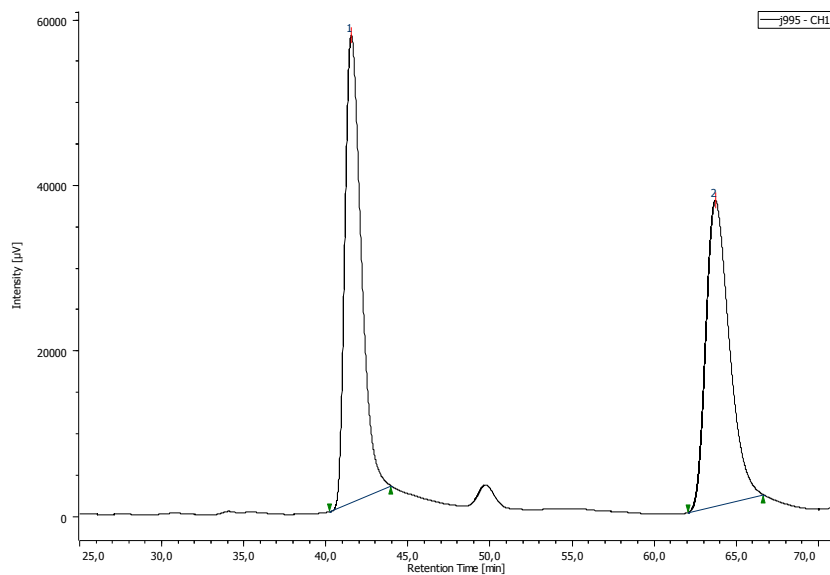


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	34,308	13830271	278146	72,909	73,260	10639	1,608	1,209
2	36,467	5138837	101524	27,091	26,740	11485	N/A	1,155

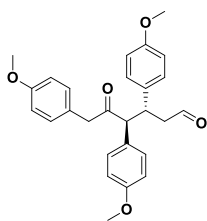




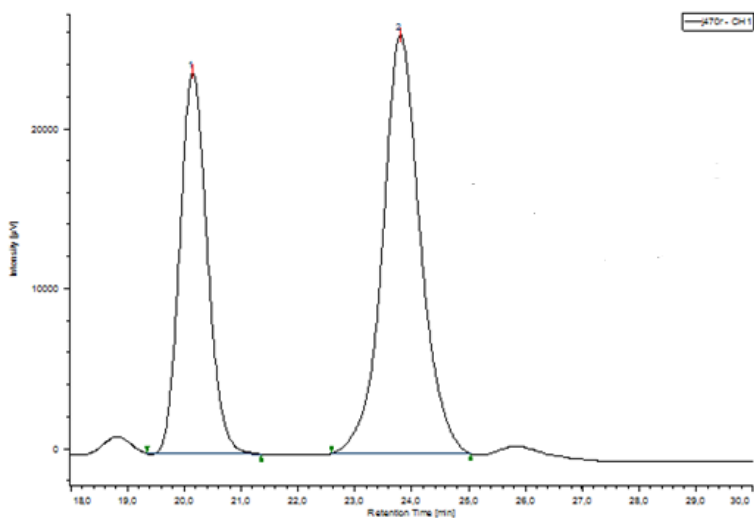
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	40,017	3581665	55298	50,555	60,762	8938	9,812	1,424
2	60,767	3503030	35709	49,445	39,238	9101	N/A	1,411



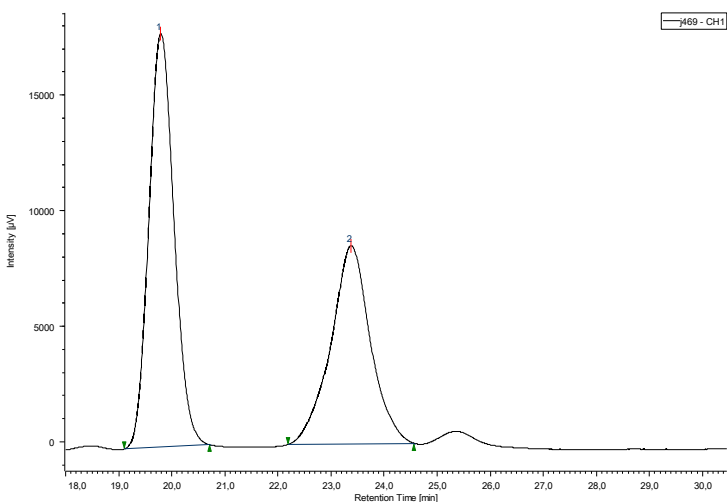
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	41,542	4503879	57353	52,606	60,374	8229	9,909	1,966
2	63,692	4057622	37643	47,394	39,626	9235	N/A	1,699



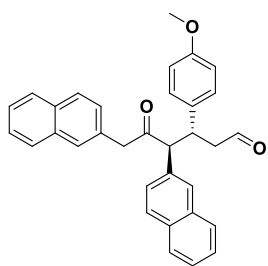
5db



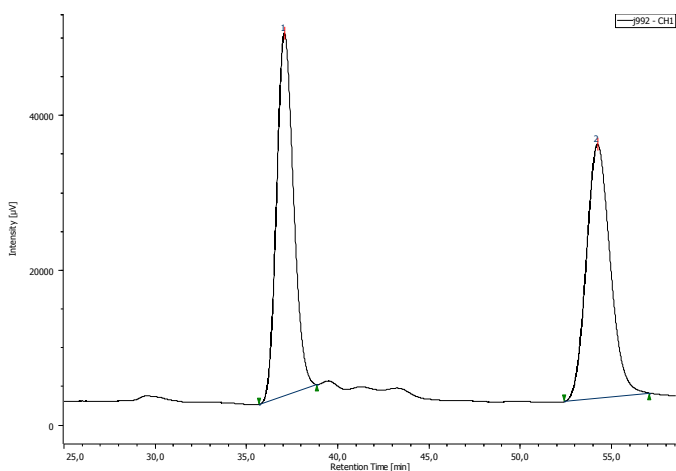
Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	20,150	795966	23821	39,773	47,665	3,608	1,127
2	23,800	1205330	26155	60,227	52,335	N/A	1,044



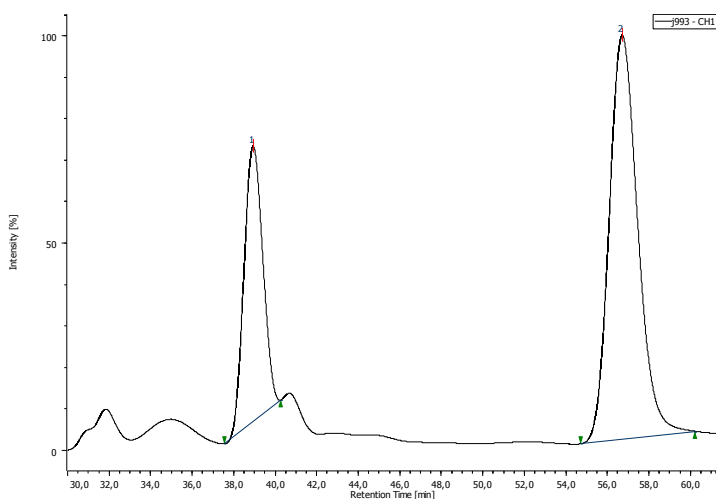
PeakName	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	19,792	587718	17853	56,997	67,583	8298	3,338	1,120
2	23,375	443424	8563	43,003	32,417	5306	N/A	0,983



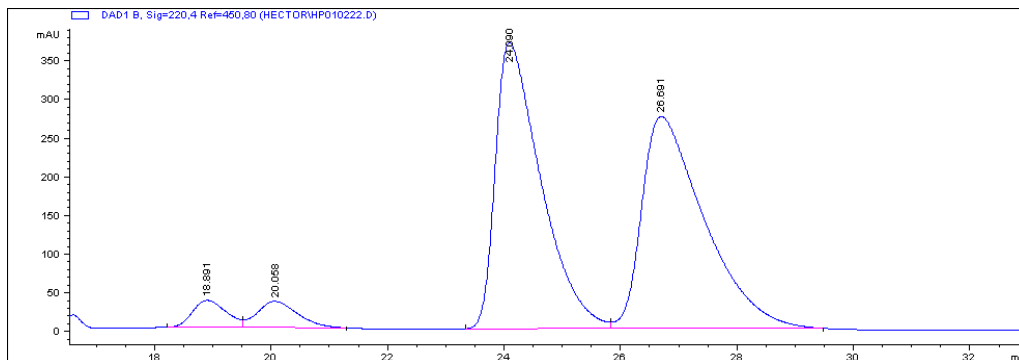
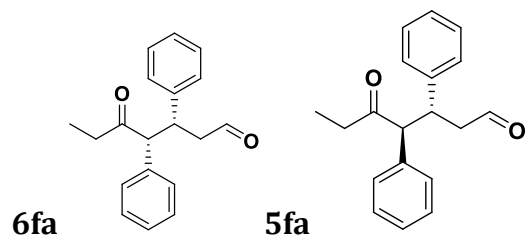
5b



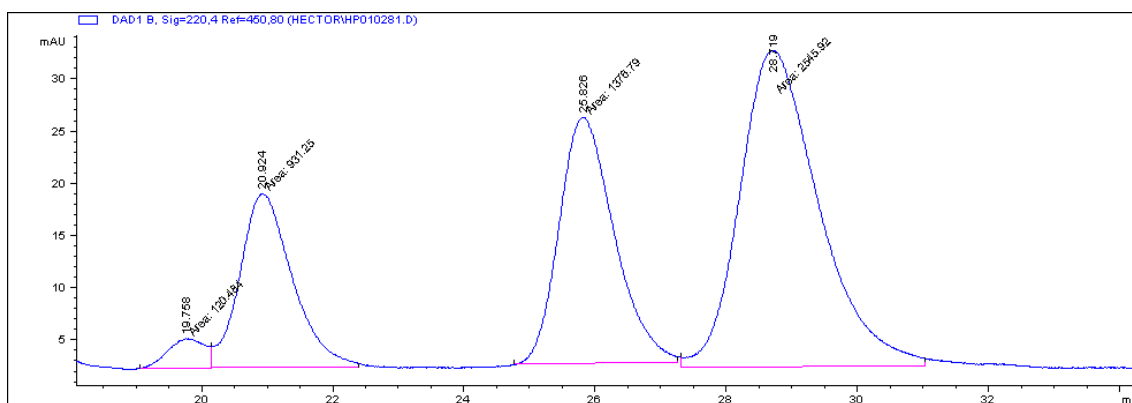
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	37,067	3014696	46702	50,384	58,803	7582	8,419	1,165
2	54,208	2968745	32719	49,616	41,197	8298	N/A	1,148



Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	38,925	3313400	52793	31,026	40,549	8307	8,507	1,071
2	56,683	7366052	77401	68,974	59,451	8374	N/A	1,196

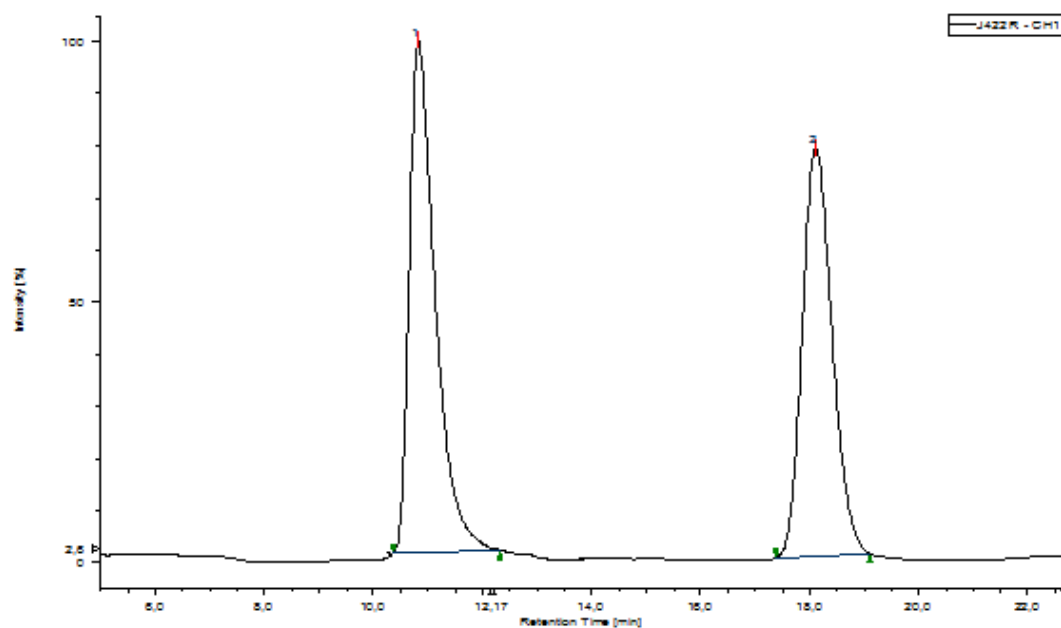


#	Time	Area	Height	Width	Area%	Symmetry
1	18.891	1471.2	35.6	0.5718	3.350	0.735
2	20.058	1692.3	34.6	0.6056	3.853	0.736
3	24.09	20169.2	370.4	0.7728	45.926	0.431
4	26.691	20583.7	274.8	1.0052	46.870	0.428

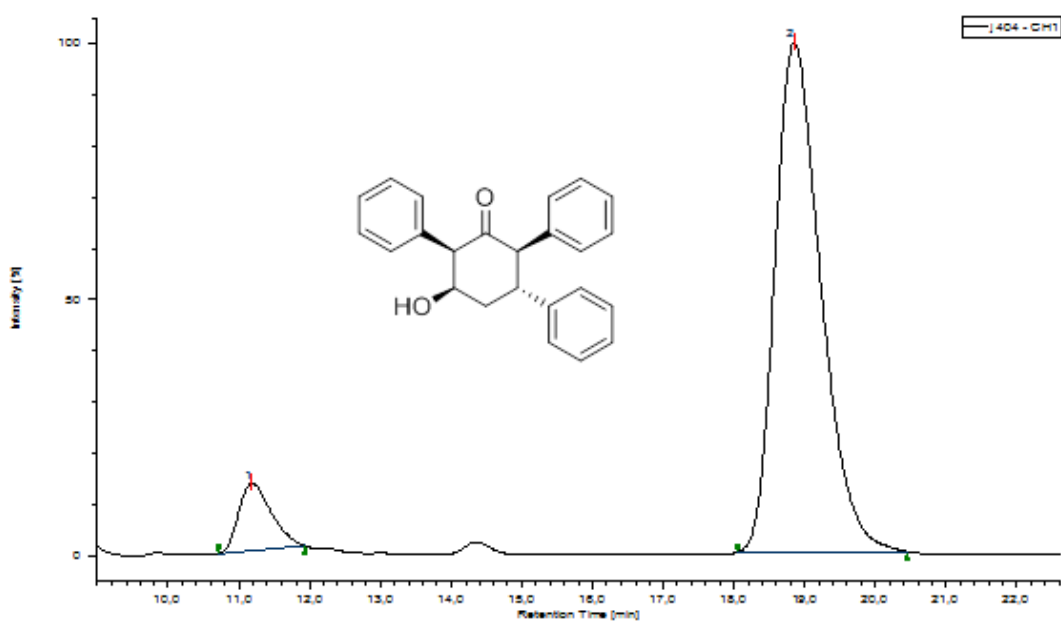


#	Time	Area	Height	Width	Area%	Symmetry
1	19.758	120.5	2.9	0.6808	2.422	0.982
2	20.924	931.2	16.7	0.9302	18.721	0.741
3	25.826	1376.8	23.6	0.9731	27.677	0.801
4	28.719	2545.9	30.4	1.3978	51.180	0.734

4aa

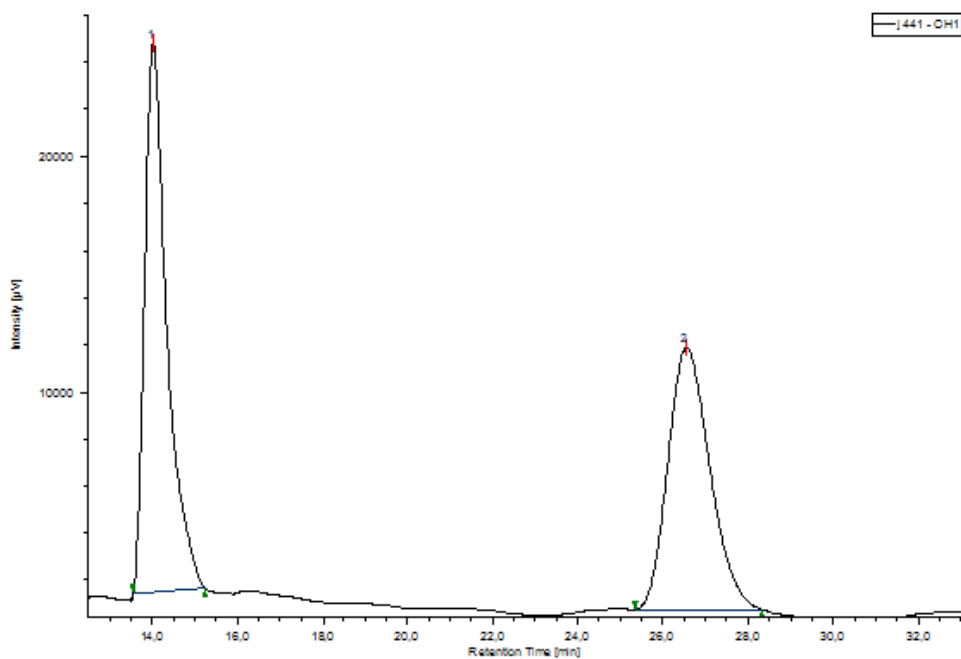


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	10,817	1177031	35457	52,295	55,614	7,893	1,738
2	18,092	1073725	28298	47,705	44,386	N/A	1,185

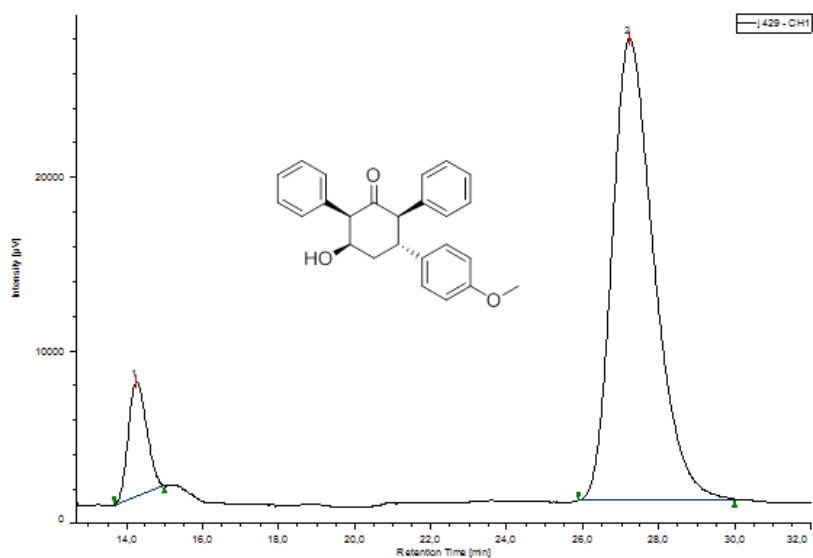


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	11,183	686694	21326	8,653	11,714	7,533	1,373
2	18,842	7249016	160729	91,347	88,286	N/A	1,333

4ab

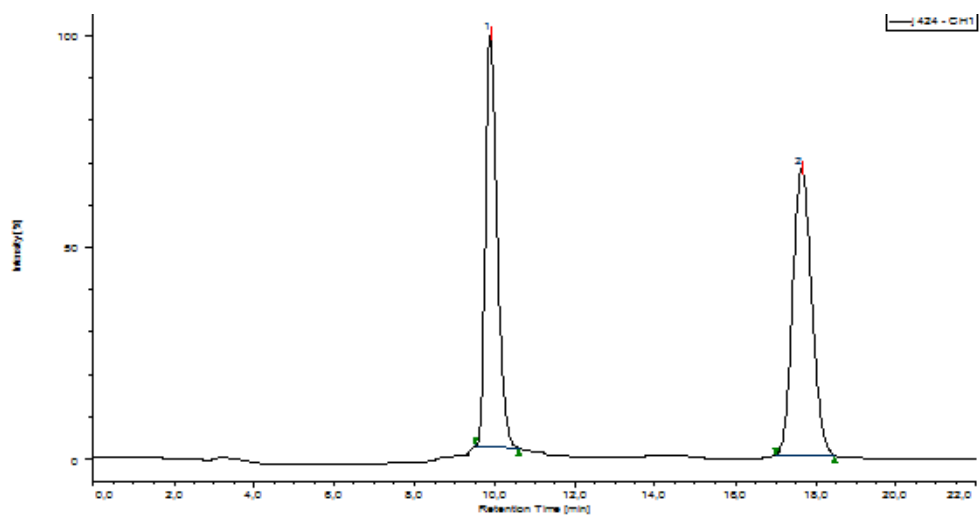


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	14,017	854516	23334	52,798	67,689	9,237	1,653
2	26,533	763945	11138	47,202	32,311	N/A	1,225

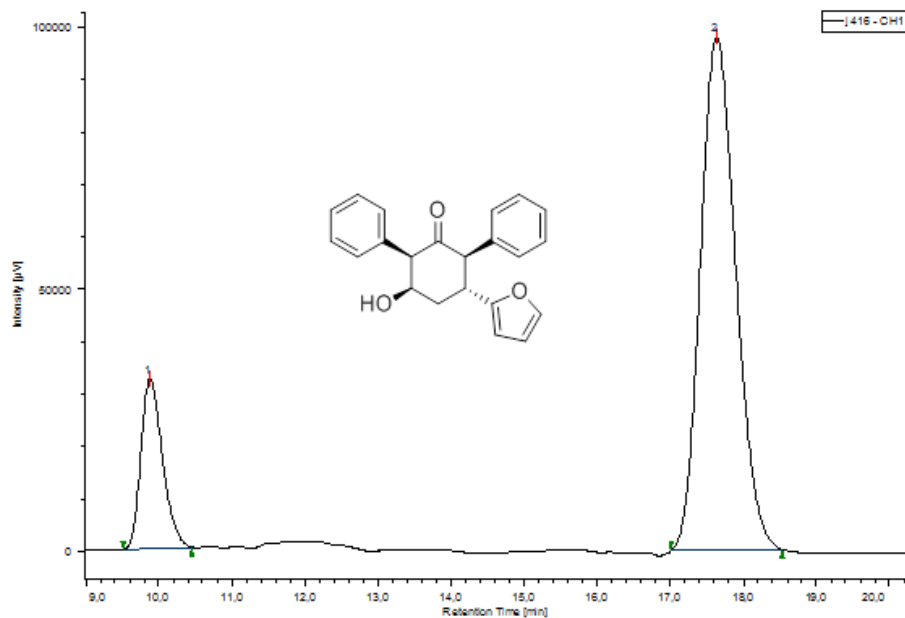


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	14,267	221893	6612	9,868	19,877	8,997	1,147
2	27,208	2026734	26655	90,132	80,123	N/A	1,344

4ac

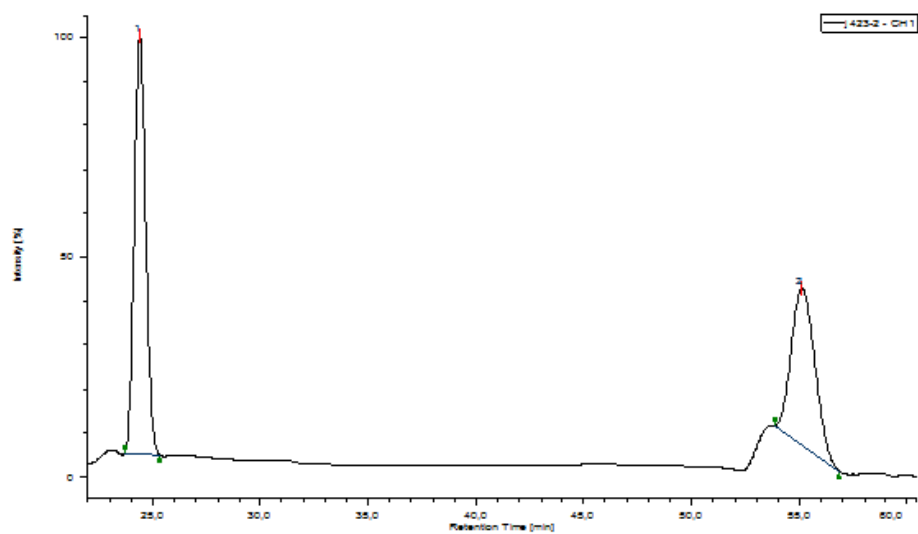


Peak	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	9,883	887984	43404	47,175	58,982	11,043	1,328
2	17,633	994353	30185	52,825	41,018	N/A	1,101

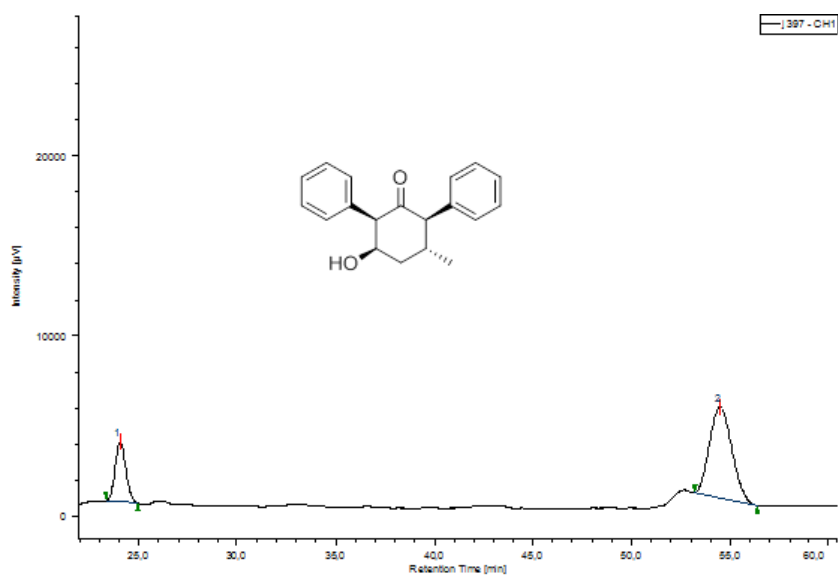


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	9,883	662104	32221	16,838	24,848	10,848	1,286
2	17,625	3270099	97451	83,162	75,152	N/A	1,166

4ad



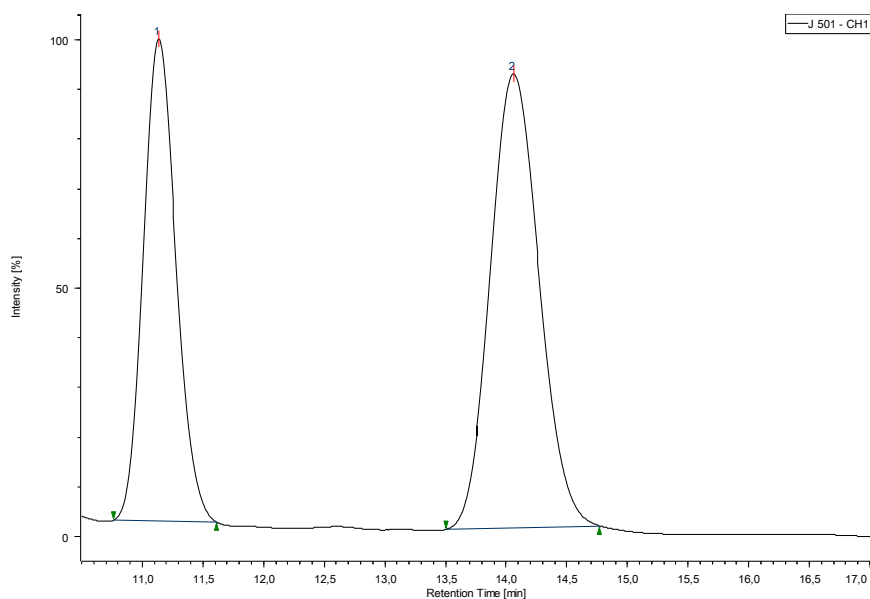
Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	24,408	355468	9759	56,165	72,733	20,284	1,085
2	55,092	277426	3658	43,835	27,267	N/A	1,104



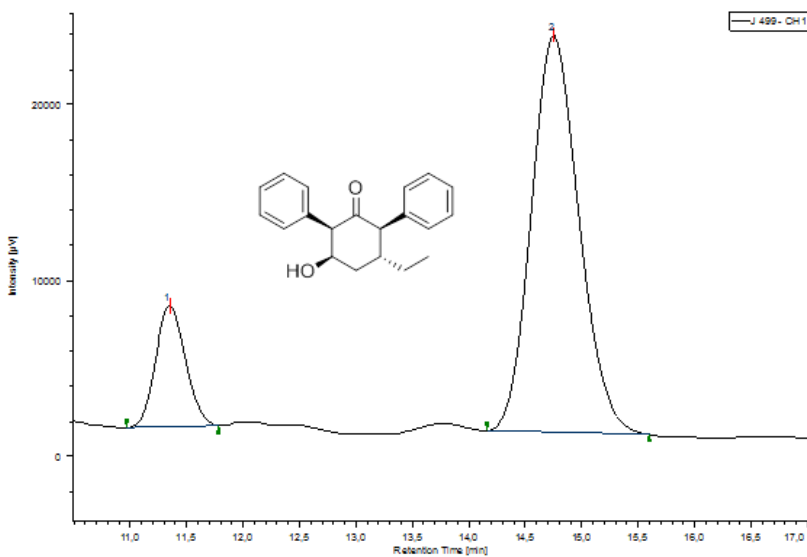
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	24,058	124074	3342	23,919	39,777	9642	19,737	1,127
2	54,450	394650	5060	76,081	60,223	10676	N/A	1,133



4ae

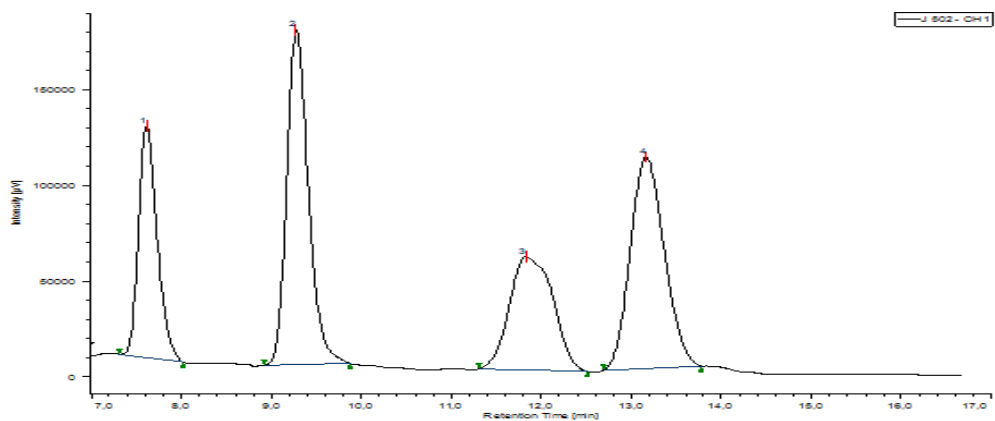


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	11,133	767165	40950	41,615	51,520	8080	4,728	1,147
2	14,058	1076302	38534	58,385	48,480	5694	N/A	1,105

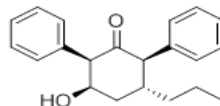
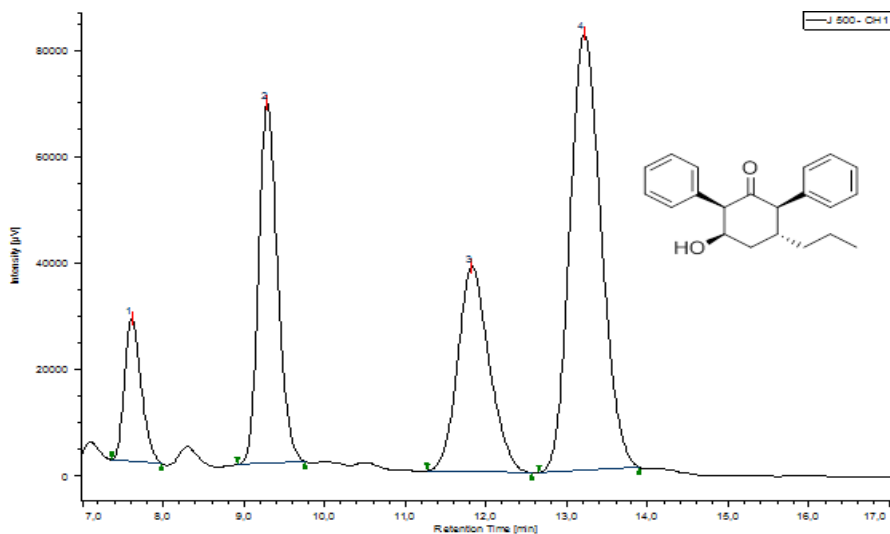


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	11,350	126714	6889	16,101	23,444	8565	5,376	1,098
2	14,742	660296	22496	83,899	76,556	5794	N/A	1,146

4af

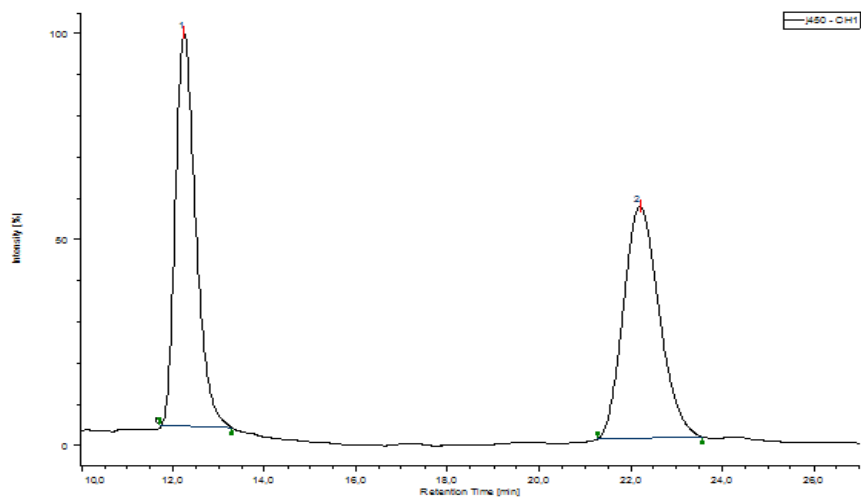


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	7,617	1732325	120890	18,199	25,995	6690	4,149	1,261
3	9,275	2912013	174687	30,593	37,562	7481	3,758	1,248
2	11,825	1977845	59023	20,779	12,692	2577	1,636	1,157
4	13,158	2896462	110458	30,429	23,751	5612	N/A	1,123

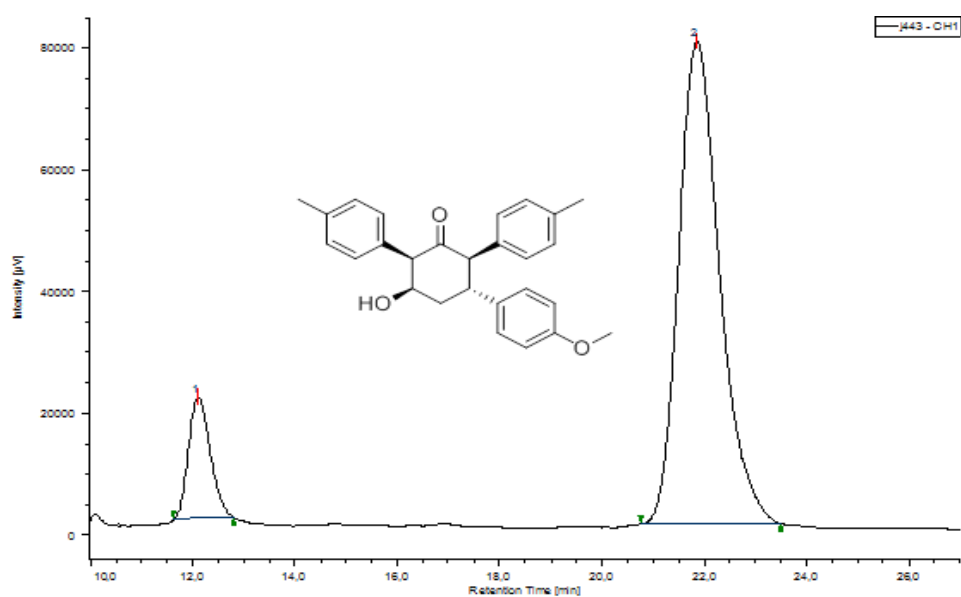


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	7,608	384677	26636	8,133	12,435	6380	4,168	1,301
3	9,283	1098167	67424	23,218	31,477	7637	4,505	1,213
2	11,817	1042870	38469	22,049	17,960	4524	1,966	1,152
4	13,208	2204043	81670	46,599	38,128	5439	N/A	1,146

4bb

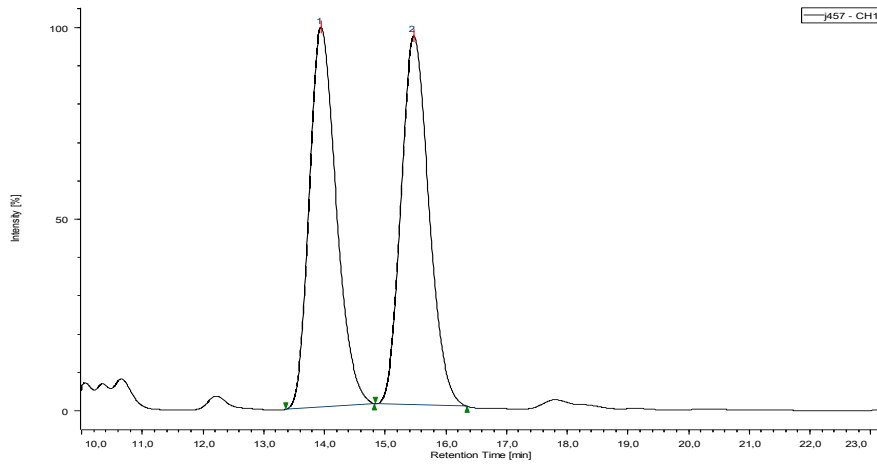


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	12,242	1236528	39965	49,216	62,922	8,901	1,354
2	22,183	1275912	23550	50,784	37,078	N/A	1,189

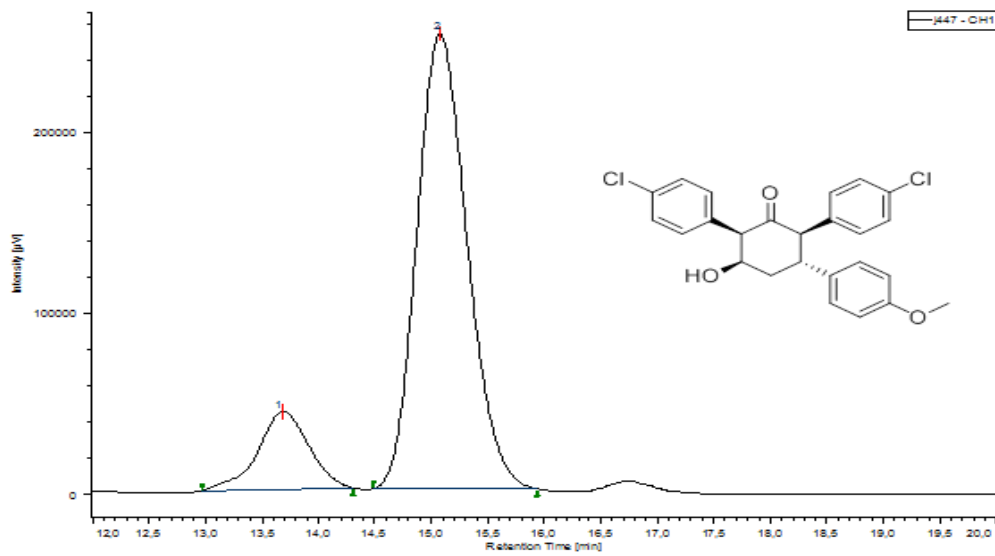


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	12,100	585686	19873	11,808	20,096	8,815	1,248
2	21,842	4374380	79017	88,192	79,904	N/A	1,276

4cb

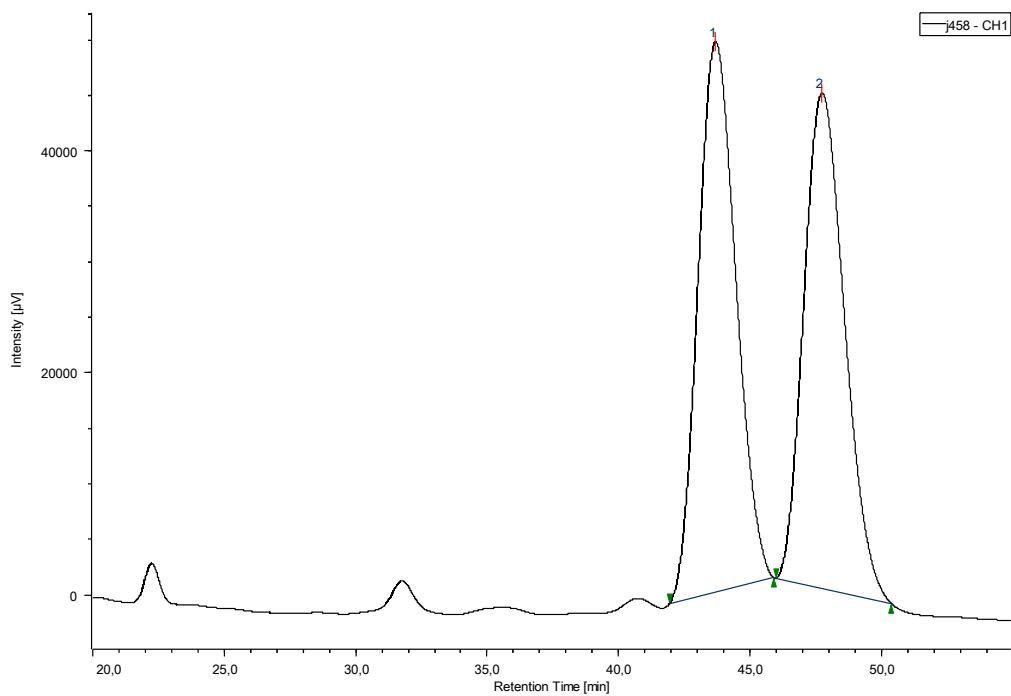


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	13,942	6482107	210153	49,887	50,746	1,847	1,262
2	15,467	6511583	203974	50,113	49,254	N/A	1,179

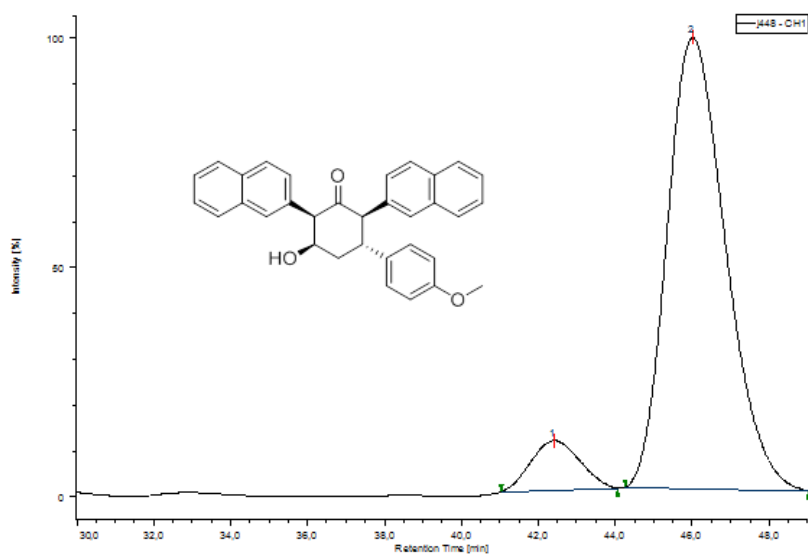


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	13,683	1355910	43008	14,891	14,631	1,728	0,930
2	15,075	7749869	250940	85,109	85,369	N/A	1,166

4eb

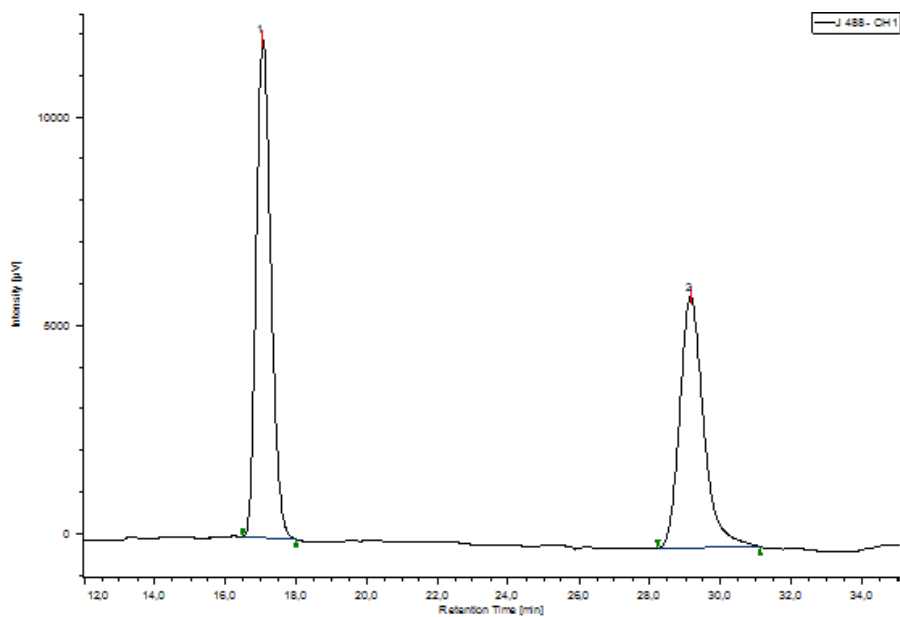


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	43,667	4967320	49482	50,887	52,627	1,452	1,133
2	47,708	4794141	44542	49,113	47,373	N/A	1,212

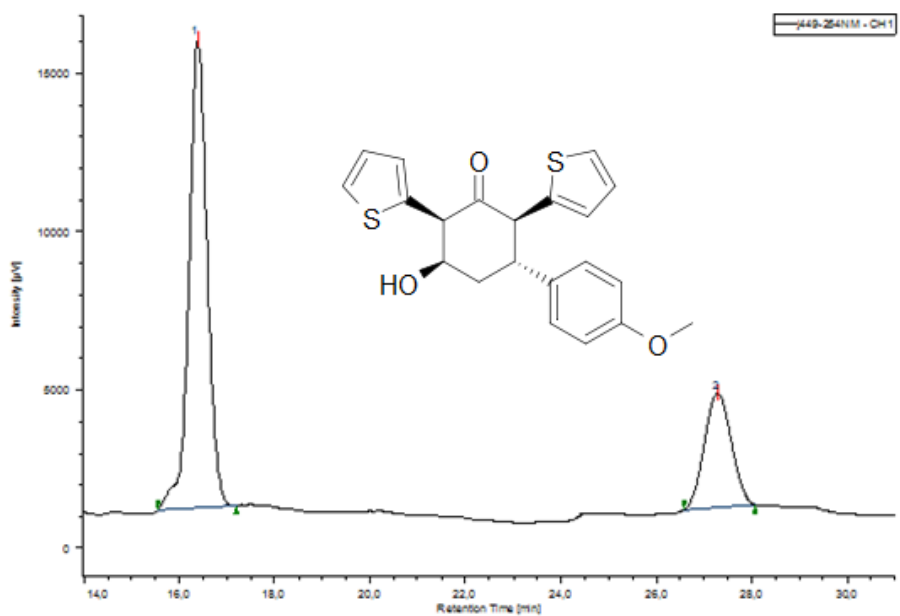


Peak Name	tR	Area	Height	Area%	Height%	Resolution	Symmetry Factor
1	42,408	1003937	11304	8,397	9,837	1,369	1,074
2	46,000	10951905	103613	91,603	90,163	N/A	1,250

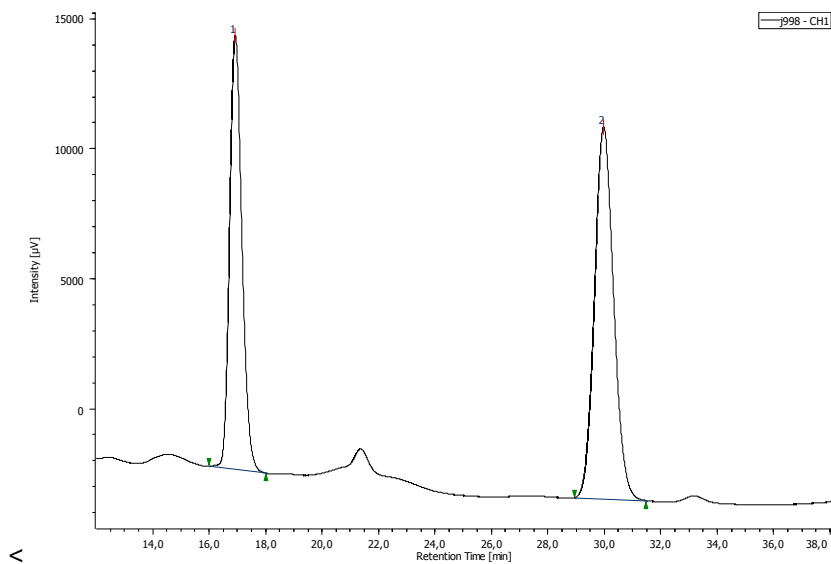
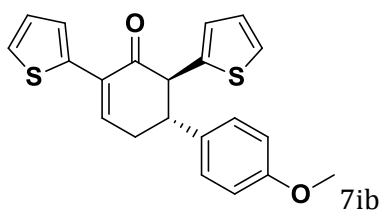
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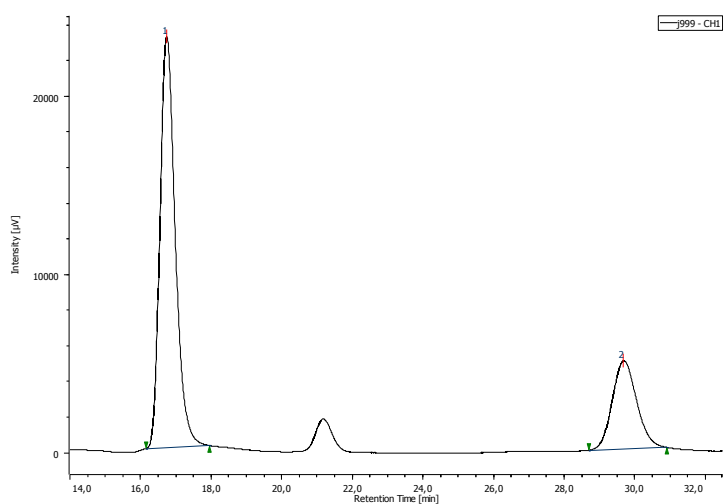
Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	17,058	343879	11969	54,749	66,485	8123	12,477	1,190
2	29,142	284219	6034	45,251	33,515	9676	N/A	1,290



Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,392	396173	14764	73,830	80,351	9178	12,545	0,971
2	27,267	140429	3610	26,170	19,649	10709	N/A	1,048

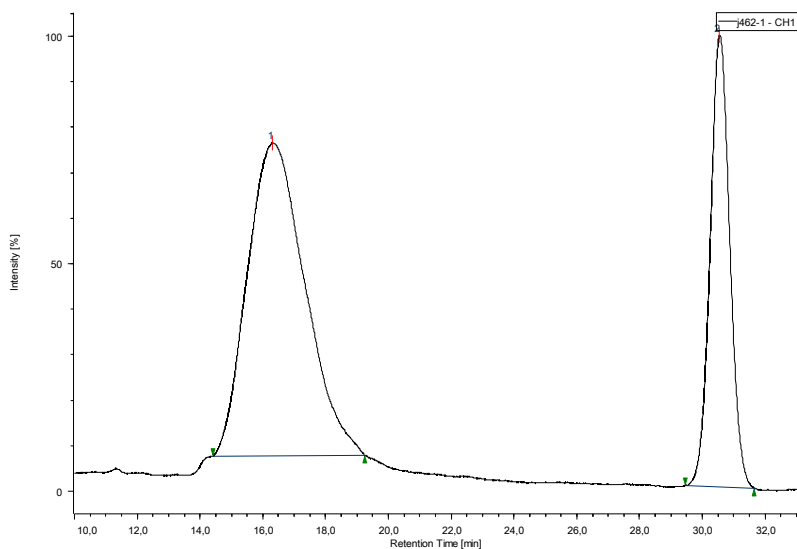


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,925	502209	16660	42,777	53,830	7378	12,899	1,179
2	29,950	671808	14289	57,223	46,170	9382	N/A	1,111

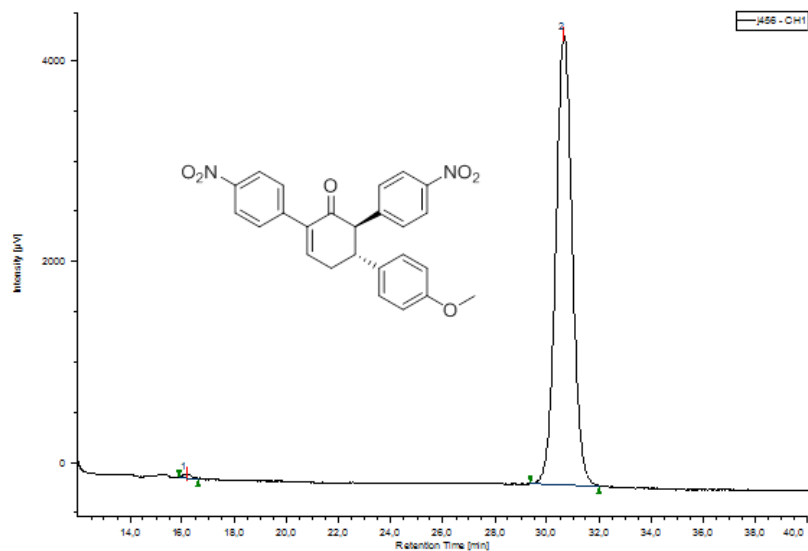


Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,742	690746	23025	74,448	82,343	7496	12,737	1,276
2	29,667	237079	4937	25,552	17,657	8850	N/A	1,135

7hb



Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,308	222185	1748	66,963	40,933	354	6,192	1,267
2	30,525	109620	2523	33,037	59,067	11532	N/A	1,045



Peak Name	tR	Area	Height	Area%	Height%	NTP	Resolution	Symmetry Factor
1	16,158	801	39	0,406	0,854	12092	16,769	1,250
2	30,617	196523	4470	99,594	99,146	11516	N/A	1,052