

Supporting Information for
**Functionalized Chiral Ionic Liquid Catalyzed Enantioselective
Desymmetrizations of Prochiral Ketones via Asymmetric Michael
Addition Reaction**

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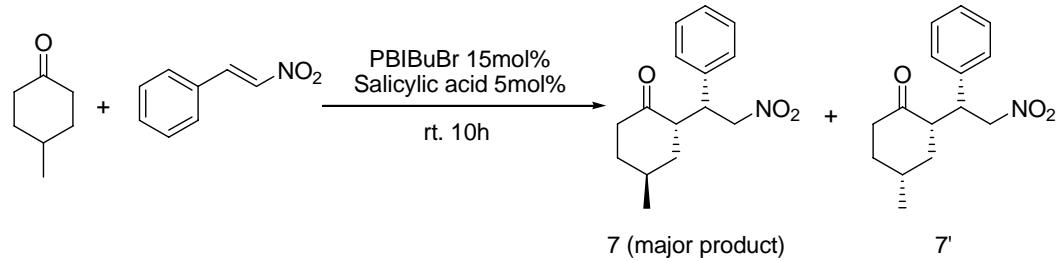
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General Information: Commercial reagents were used as received, unless otherwise stated. Chemical shifts are reported in ppm from tetramethylsilane with the solvent

resonance as the internal standard. The following abbreviations were used to designate chemical shift multiplicities: s = singlet, d= doublet, t= triplet, q= quartet, h= heptet, m= multiplet, br= broad. All first-order splitting patterns were assigned on the basis of the appearance of the multiplet. Splitting patterns that could not be easily interpreted are designated as multiplet (m) or broad (br). Mass spectra were obtained using fast-atom bombard (FAB) spectrometer or electrospray ionization (ESI) mass spectrometer. Optical rotations were measured using a 1 mL cell with a 1 dm path length on a Perkin-Elmer 341 digital polarimeter and are reported as follows: $[\alpha]_D^{20^\circ C}$ (*c* in g per 100 mL of solvent). HPLC analysis was performed using ChiralPak columns purchased.

The catalysts used in this communication were synthesized following our previous procedure. (Angew. Chem. Int. Ed. 2006, 45, 3093-3097; Chem. Commun. 2006, 3687–3689).

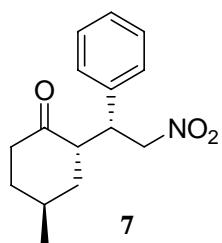
General procedure for desymmetric Michael addition reactions:



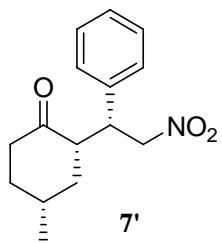
Nitrostyrene (37 mg, 0.25 mmol), FCIL PBIBuBr (12.7 mg, 15 mol%) and salicylic acid (1.7mg, 5mol%) were mixed with *p*-Methyl cyclohexanone (0.3 mL, 2.5 mmol) at room temperature. The homogeneous reaction mixture was stirred at room

temperature for 10 h. The reaction mixture was diluted with ether to precipitate the catalyst. The organic layer was separated and loaded onto silica gel column to afford the Michael product (58 mg, 90%) as yellow oil: d.r.=6.2:1, 97% ee (by HPLC on a chiral phase chiralpak OD-H column, 254 nm, i PrOH/hexane= 10:90, 0.5 mL • min $^{-1}$; t_R = 27.2 min (minor), 30.4 min (major)). The catalyst was used directly for the next run after removing the residue solvents.

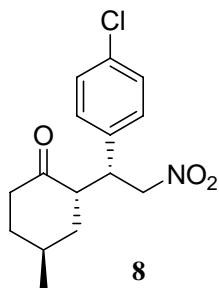
NMR data for Michael products:



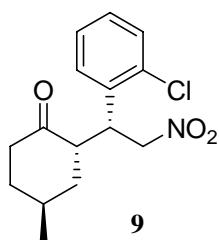
Pale-yellow oil. $[\alpha]_D^{20} = -45.0$ (97%ee, $c = 1.0$, CHCl_3); ^1H NMR (300 MHz, CDCl_3): δ 0.97 (3H, d, $J = 6.59$ Hz), 1.35-1.50 (2H, m), 1.56-1.68 (1H, m), 1.94-2.12 (2H, m), 2.50 (2H, t, $J = 6.59$ Hz), 2.69-2.77 (1H, m), 3.76-3.84 (1H, m), 4.56-4.73 (2H, m), 7.16-7.18 (2H, m), 7.26-7.36 (3H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 19.4, 26.5, 34.4, 37.9, 38.6, 44.1, 50.0, 79.1, 128.0, 129.1, 137.3, 213.0. HRMS for $\text{C}_{15}\text{H}_{19}\text{NO}_3^+$ (M^+), calcd. 261.1359, found 261.1368



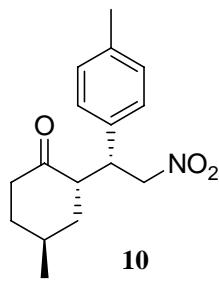
Pale-yellow oil. ^1H NMR (300 MHz, CDCl_3): δ 0.86 (3H, d, $J = 6.59$ Hz), 0.94-1.00 (1H, m), 1.30-1.46 (1H, m), 1.61-1.69 (1H, m), 1.81-1.92 (1H, m), 1.99-2.09 (1H, m), 2.40-2.50 (2H, m), 2.71-2.81 (1H, m), 3.68-3.76 (1H, m), 4.64 (1H, dd, $J=12.43\text{Hz}$, 9.8Hz), 4.97 (1H, dd, $J=12.43\text{Hz}$, 4.52Hz), 7.14-7.34 (5H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 20.9, 32.3, 36.4, 41.2, 42.2, 43.9, 51.3, 78.9, 127.7, 128.2, 128.9, 137.8, 212.0. HRMS for $\text{C}_{15}\text{H}_{19}\text{NO}_3^+$ (M^+), calcd. 261.1359, found 261.1366.



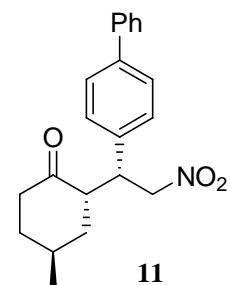
Colorless oil. $[\alpha]_D^{20} = -45.0$ (99%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.99 (3H, d, *J* = 6.59 Hz), 1.40-1.45 (2H, m), 1.59-1.70 (1H, m), 1.90-2.07 (2H, m), 2.44-2.50 (2H, m), 2.66-2.74 (1H, m), 3.74-3.82 (1H, m), 4.52-4.74 (2H, m), 7.11 (2H, d, *J* = 8.23 Hz), 7.31 (2H, d, *J* = 8.23 Hz); ¹³C NMR (CDCl₃, 75 MHz): δ 19.2, 26.5, 34.1, 37.9, 38.5, 43.5, 49.5, 78.8, 129.3, 129.4, 133.9, 135.9, 212.3. HRMS for C₁₅H₁₈ClNO₃⁺ (M⁺), calcd. 295.0970, found 295.0979.



White foam. $[\alpha]_D^{20} = -62.3$ (97%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 1.04 (3H, d, *J* = 6.86 Hz), 1.41-1.56 (2H, m), 1.65-1.74 (1H, m), 1.92-2.03 (1H, m), 2.08-2.17 (1H, m), 2.46-2.53 (2H, m), 2.94-3.03 (1H, m), 4.30-4.38 (1H, m), 4.70-4.88 (2H, m), 7.19-7.28 (3H, m), 7.37-7.41 (1H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 18.9, 26.9, 34.1, 38.1, 38.6, 127.5, 129.0, 130.4, 135.2, 212.5.

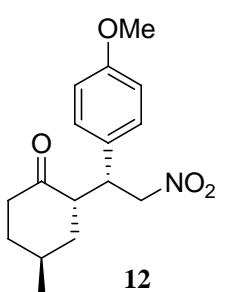


Pale-yellow oil. $[\alpha]_D^{20} = -46.9$ (98%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.97 (3H, d, *J* = 6.59 Hz), 1.37-1.51 (2H, m), 1.57-1.67 (1H, m), 1.93-2.10 (2H, m), 2.32 (3H, s), 2.47-2.52 (2H, m), 2.66-2.74 (1H, m), 3.72-3.80 (1H, m), 4.53-4.69 (2H, m), 7.03-7.15 (4H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 19.5, 21.1, 26.5, 34.4, 37.8, 38.6, 43.8, 50.2, 79.2, 127.8, 129.8, 134.1, 137.7, 213.0. HRMS for C₁₆H₂₁NO₃⁺ (M⁺), calcd. 275.1516, found 275.1525.

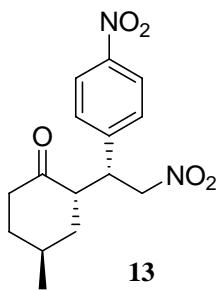


White solid. $[\alpha]_D^{20} = -31.6$ (94%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.99 (3H, d, *J* = 6.86 Hz), 1.40-1.53 (2H, m), 1.60-1.69 (1H, m), 1.94-2.10 (2H, m), 2.50 (2H, t, *J* = 6.59 Hz), 2.72-2.80 (1H, m), 3.80-3.89 (1H, m), 4.60-4.76 (2H, m), 7.24 (2H, d, *J* = 8.51 Hz), 7.31-7.36 (1H, m), 7.40-7.45 (2H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 19.4, 26.6, 34.4, 37.9, 38.6, 43.8, 7.55-7.58 (4H, m).

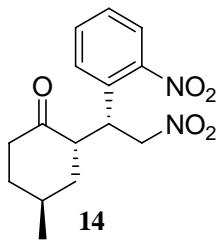
50.0, 79.0, 127.0, 127.5, 127.8, 128.5, 128.6, 136.3, 140.3, 140.9, 212.8. HRMS for $C_{21}H_{23}NO_3^+$ (M^+), calcd. 337.1672, found 337.1682.



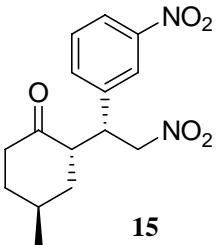
Pale-yellow oil. $[\alpha]_D^{20} = -35.0$ (97%*ee*, c= 1.0, $CHCl_3$); 1H NMR (300 MHz, $CDCl_3$): δ 0.96 (3H, d, $J = 6.86$ Hz), 1.37-1.50 (2H, m), 1.56-1.66 (1H, m), 1.93-2.08 (2H, m), 2.46-2.51 (2H, m), 2.63-2.71 (1H, m), 3.70-3.78 (4H, m), 4.50-4.68 (2H, m), 6.84-6.88 (2H, m), 7.05-7.10 (1H, m); ^{13}C NMR ($CDCl_3$, 75 MHz): δ 19.5, 26.5, 34.4, 37.8, 38.6, 43.4, 50.3, 55.2, 79.3, 114.5, 129.0, 159.2, 213.1. HRMS for $C_{16}H_{21}NO_4^+$ (M^+), calcd. 291.1465, found 291.1474.



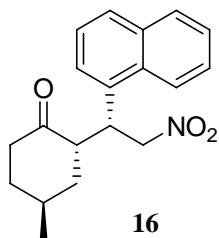
Yellow oil. $[\alpha]_D^{20} = -46.0$ (96%*ee*, c= 1.0, $CHCl_3$); 1H NMR (300 MHz, $CDCl_3$): δ 1.03 (3H, d, $J = 6.86$ Hz), 1.42-1.47 (2H, m), 1.56-1.76 (1H, m), 1.91-2.09 (2H, m), 2.39-2.58 (2H, m), 2.76-2.85 (1H, m), 3.90-3.98 (1H, m), 4.61-4.86 (2H, m), 7.39 (2H, d, $J = 8.78$ Hz), 8.20 (2H, d, $J = 8.78$ Hz); ^{13}C NMR ($CDCl_3$, 75 MHz): δ 18.8, 26.6, 33.8, 38.0, 38.4, 43.8, 48.8, 78.2, 124.2, 129.2, 129.6, 145.2, 147.6, 211.5. HRMS for $C_{15}H_{18}N_2O_5^+$ (M^+), calcd. 306.1210, found 306.1220.



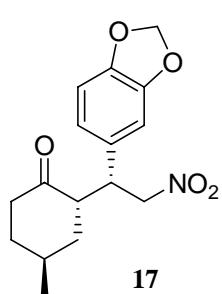
White solid. $[\alpha]_D^{20} = -115.4$ (97%*ee*, c= 1.0, $CHCl_3$); 1H NMR (300 MHz, $CDCl_3$): δ 1.06 (3H, d, $J = 6.86$ Hz), 1.46-1.55 (1H, m), 1.60-1.78 (2H, m), 1.89-2.00 (1H, m), 2.05-2.14 (1H, m), 2.34-2.43 (1H, m), 2.47-2.57 (1H, m), 2.99-3.07 (1H, m), 4.33-4.41 (1H, m), 4.81-4.85 (2H, m), 7.40-7.45 (2H, m), 7.57-7.62 (1H, m) 7.81-7.84 (1H, m); ^{13}C NMR ($CDCl_3$, 75 MHz): δ 18.4, 26.9, 33.7, 38.4, 38.5, 48.4, 77.8, 125.0, 128.7, 132.7, 133.2, 150.9, 211.9. HRMS for $C_{15}H_{18}N_2O_5^+$ (M^+), calcd. 306.1210, found 306.1219.



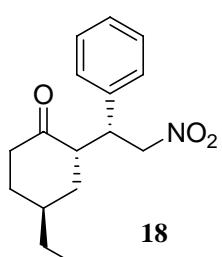
Pale-yellow oil. $[\alpha]_D^{20} = -31.8$ (98%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 1.03 (3H, d, *J* = 7.14 Hz), 1.446-1.48 (2H, m), 1.66-1.77 (1H, m), 1.91-2.12 (2H, m), 2.39-2.56 (2H, m), 2.79-2.87 (1H, m), 3.90-3.99 (1H, m), 4.63-4.86 (2H, m), 7.53-7.56 (2H, m), 8.08-8.18 (2H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 18.8, 26.6, 33.8, 38.0, 38.4, 43.7, 48.8, 78.3, 122.9, 123.1, 130.1, 134.5, 139.9, 211.7. HRMS for C₁₅H₁₈N₂O₅⁺ (M⁺), calcd. 306.1210, found 306.1219.



Pale-yellow oil. $[\alpha]_D^{20} = -91.0$ (97%*ee*, c= 2.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.91 (3H, d, *J* = 6.86 Hz), 1.30-1.48 (2H, m), 1.64-1.72 (1H, m), 1.91-2.04 (2H, m), 2.51-2.56 (1H, m), 2.91-3.08 (1H, br), 4.82-4.99 (3H, m), 7.36-7.59 (4H, m), 7.83 (2H, dd, *J* = 23.88 Hz, 8.23 Hz), 8.11-8.25 (1H, br); ¹³C NMR (CDCl₃, 75 MHz): δ 18.8, 27.0, 34.2, 38.2, 38.7, 50.2, 79.0, 122.6, 125.5, 126.0, 126.7, 128.3, 129.2, 213.0. HRMS for C₁₉H₂₁NO₃⁺ (M⁺), calcd. 311.1516, found 311.1525.

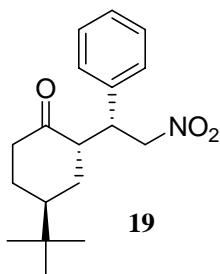


Colorless oil. $[\alpha]_D^{20} = -37.3$ (96%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.98 (3H, d, *J* = 6.59 Hz), 1.40-1.50 (2H, m), 1.58-1.65 (1H, m), 1.95-2.08 (2H, m), 2.47 (2H, t, *J* = 6.31 Hz), 2.60-2.68 (1H, m), 3.66-3.75 (1H, m), 4.47-4.67 (2H, m), 5.95 (2H, s), 6.60-6.76 (3H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 19.5, 26.5, 34.4, 37.8, 38.5, 43.9, 50.2, 79.2, 101.3, 107.7, 108.7, 121.7, 130.8, 147.3, 148.3, 212.9. HRMS for C₁₆H₁₉NO₅⁺ (M⁺), calcd. 305.1258, found 305.1266.

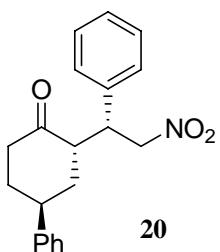


Pale-yellow solid. $[\alpha]_D^{20} = -41.5$ (97%*ee*, c= 2.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 0.79 (3H, t, *J* = 7.41 Hz), 1.20-1.41 (4H, m), 1.61-1.76 (2H, m), 1.93-2.03 (1H, m), 2.45-2.51 (2H, m),

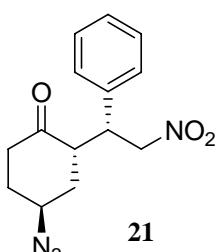
2.65-2.73 (1H, m), 3.75-3.83 (1H, m), 4.56-4.74 (2H, m), 7.16-7.19 (2H, m), 7.28-7.37 (3H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 11.8, 26.3, 32.2, 33.4, 35.4, 38.7, 44.1, 50.1, 79.1, 128.0, 129.1, 137.2, 213.1. HRMS for $\text{C}_{16}\text{H}_{21}\text{NO}_3^+$ (M^+), calcd. 275.1516, found 275.1525.



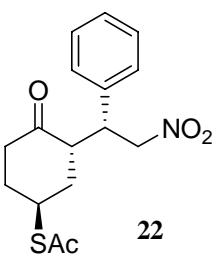
Pale-yellow solid. $[\alpha]_D^{20} = -65.8$ (98%*ee*, $c = 2.0$, CHCl_3); ^1H NMR (300 MHz, CDCl_3): δ 0.72 (9H, s), 1.32-1.43 (1H, m), 1.47-1.65 (3H, m), 2.03-2.13 (1H, m), 2.43-2.50 (1H, m), 2.54-2.66 (2H, m), 3.79-3.89 (1H, m), 4.49-4.64 (2H, m), 7.17-7.21 (2H, m), 7.28-7.38 (3H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 27.1, 27.2, 29.6, 32.3, 39.0, 40.9, 44.2, 52.1, 79.1, 128.1, 128.3, 129.1, 136.6, 213.8. HRMS for $\text{C}_{18}\text{H}_{25}\text{NO}_3^+$ (M^+), calcd. 303.1829, found 303.1838.



White solid. $[\alpha]_D^{20} = -25.3$ (97%*ee*, $c = 2.0$, CHCl_3); ^1H NMR (300 MHz, CDCl_3): δ 1.57-1.66 (1H, m), 1.80-1.90 (1H, m), 2.06-2.17 (2H, m), 2.42-2.52 (1H, m), 2.60-2.71 (2H, m), 3.04-3.13 (1H, m), 3.83-3.92 (1H, m), 4.46-4.60 (2H, m), 7.01-7.04 (2H, m), 7.11-7.29 (8H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 32.7, 36.4, 36.9, 39.0, 44.1, 51.4, 79.1, 126.5, 126.7, 128.0, 128.3, 128.7, 128.8, 129.3, 136.8, 143.2, 212.3. HRMS for $\text{C}_{20}\text{H}_{21}\text{NO}_3^+$ (M^+), calcd. 323.1516, found 323.1525.



Colorless oil. $[\alpha]_D^{20} = +2.4$ (93%*ee*, $c = 1.0$, CHCl_3); ^1H NMR (300 MHz, CDCl_3): δ 1.41-1.51 (1H, m), 1.80-1.89 (1H, m), 1.91-1.98 (1H, m), 2.18-2.27 (1H, m), 2.36-2.43 (1H, m), 2.66-2.77 (1H, m), 3.03-3.13 (1H, m), 3.73-3.81 (1H, m), 3.93-3.96 (1H, m), 4.61 (1H, dd, $J = 12.62$ Hz, 9.88 Hz), 4.97 (1H, dd, $J = 12.62$ Hz, 4.67 Hz), 7.15-7.18 (2H, m), 7.28-7.41 (3H, m); ^{13}C NMR (CDCl_3 , 75 MHz): δ 31.8, 36.5, 37.7, 43.3, 46.7, 56.2, 79.0, 128.0, 128.1, 129.2, 137.1, 209.9. HRMS for $\text{C}_{14}\text{H}_{16}\text{N}_4\text{O}_3^+$ (M^+), calcd. 288.1217, found 288.1226.



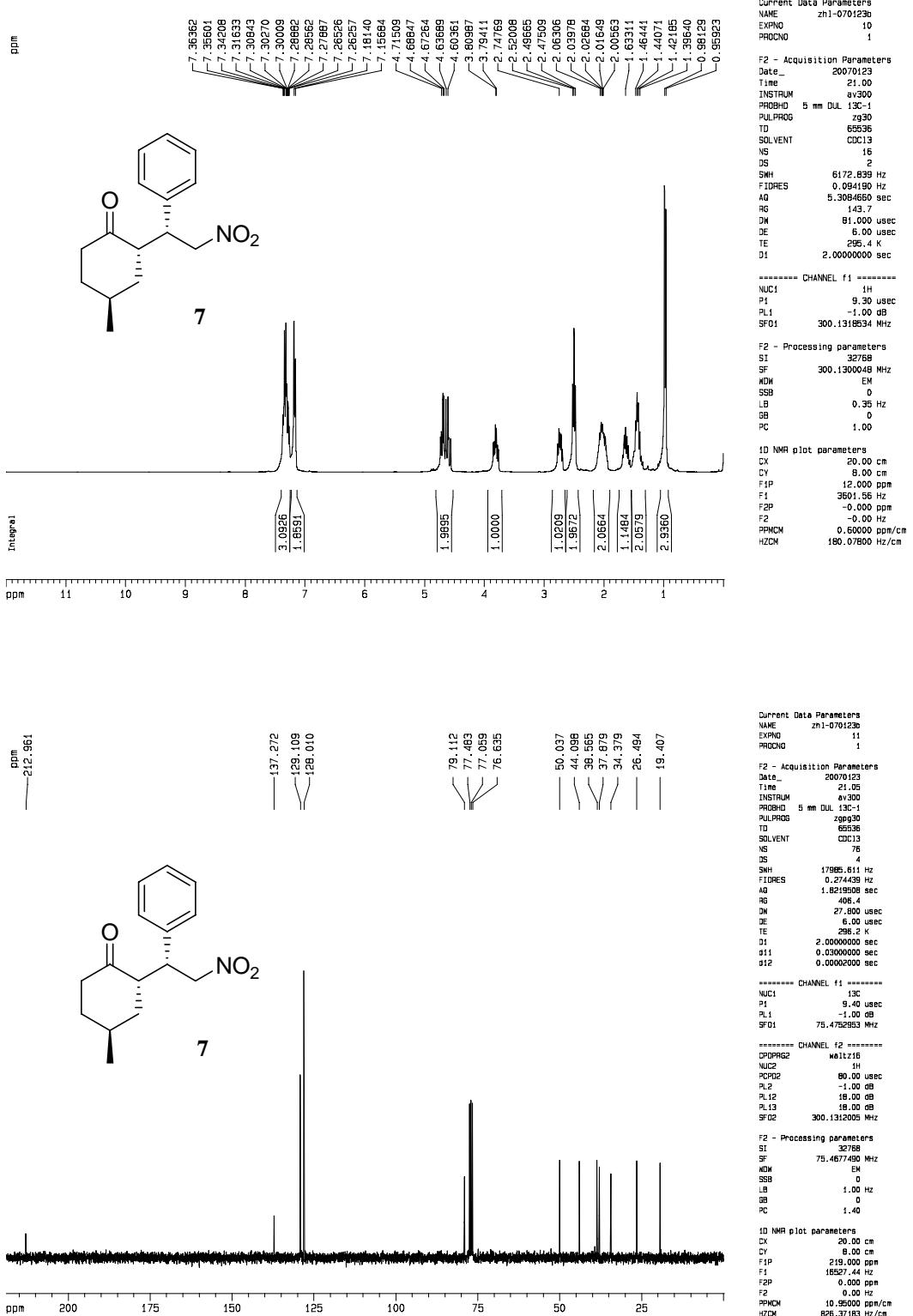
Pale-yellow oil. $[\alpha]_D^{20} = -19.4$ (93%*ee*, c= 1.0, CHCl₃); ¹H NMR (300 MHz, CDCl₃): δ 1.64-1.76 (1H, m), 1.79-1.87 (1H, m), 2.11-2.22 (2H, m), 2.33 (3H, s), 2.43-2.51 (1H, m), 2.55-2.66 (1H, m), 2.86-2.94 (1H, m), 3.76-3.84 (1H, m), 3.97-4.00 (1H, m), 4.75 (2H, ddd, *J*=73.55Hz, 12.62Hz, 4.94Hz), 7.13-7.34 (5H, m); ¹³C NMR (CDCl₃, 75 MHz): δ 30.9, 33.4, 37.4, 39.4, 43.4, 49.3, 78.8, 128.0, 128.1, 129.1, 137.0, 194.0, 210.0. HRMS for C₁₆H₁₉NO₄S⁺ (M⁺), calcd. 321.1029, found 321.1039.

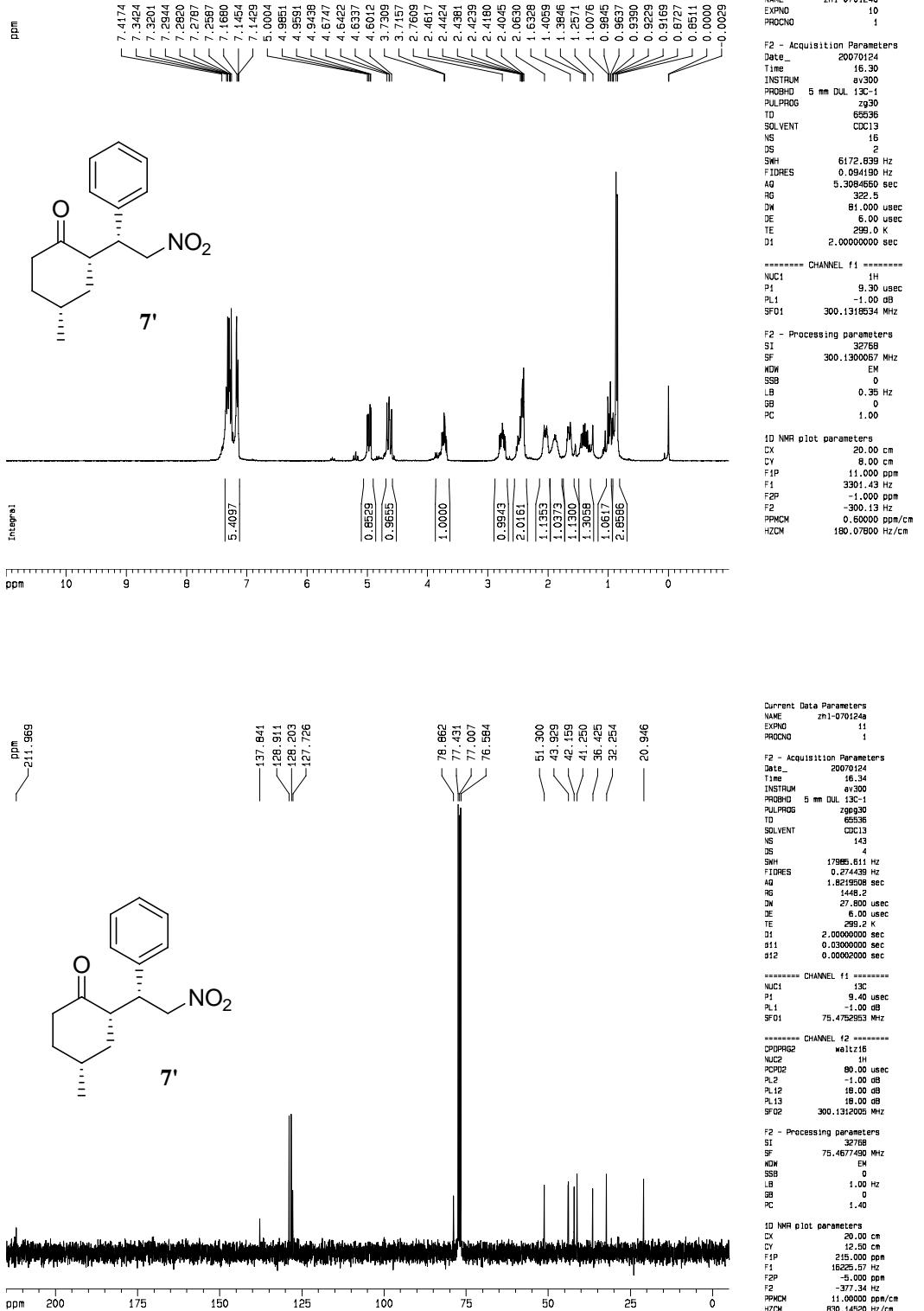
HPLC Conditions

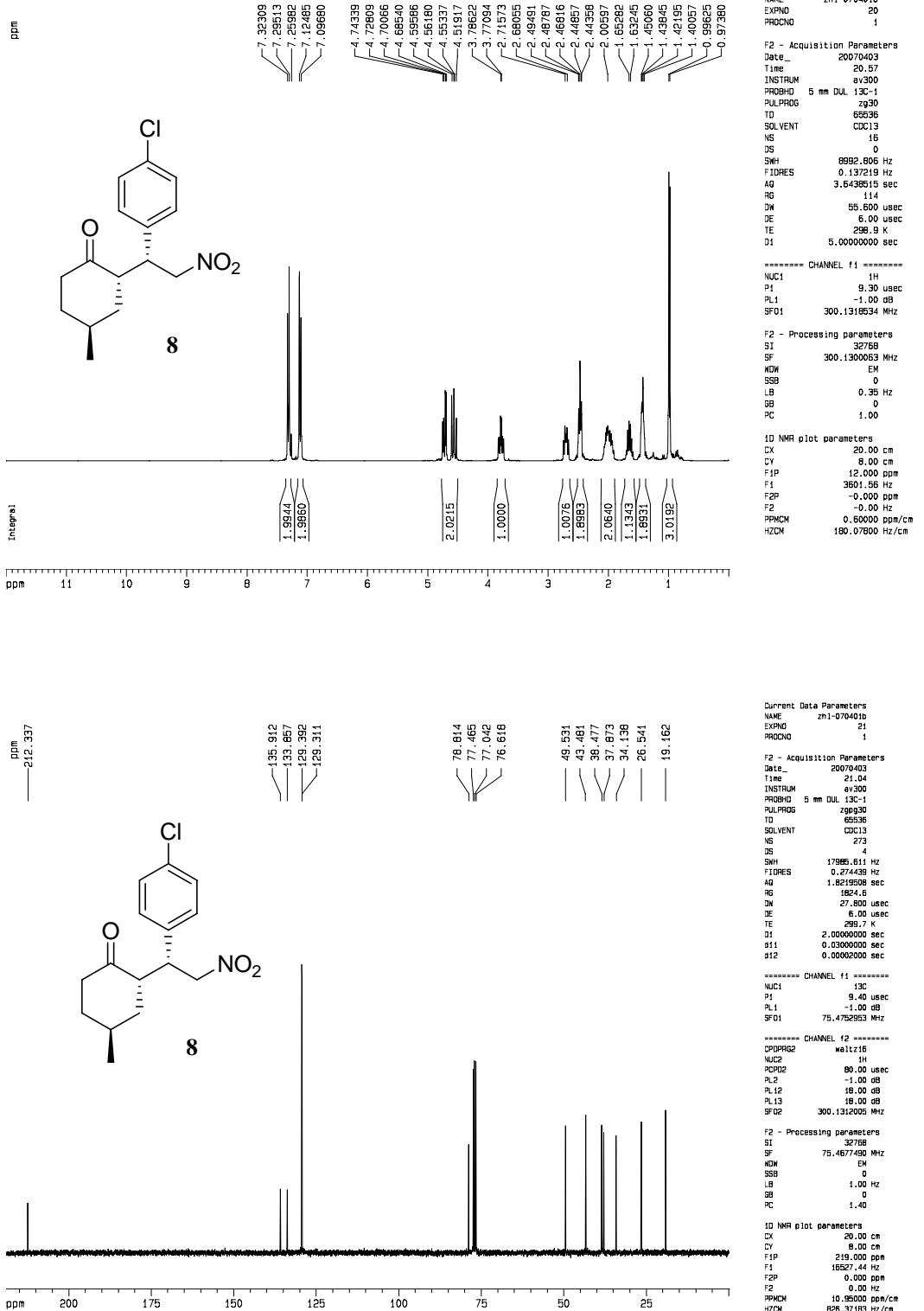
Compounds	HPLC Conditions
7	OD-H column, 254 nm, 2-propanol: hexane=10:90, 0.5 mL/min; <i>tR</i> =27.24 min (minor), 30.39 min (major)
8	OD-H column, 254 nm, 2-propanol: hexane=10:90, 0.5 mL/min; <i>tR</i> =30.32 min (minor), 35.70 min (major)
9	AD-H column, 254 nm, 2-propanol: hexane=5:95, 0.5 mL/min; <i>tR</i> =22.17 min (minor), 27.20 min (major)
10	AS-H column, 254 nm, 2-propanol: hexane=10:90, 0.5 mL/min; <i>tR</i> =20.21 min (minor), 38.06 min (major)
11	AD-H column, 254 nm, 2-propanol: hexane=5:95, 0.5 mL/min; <i>tR</i> =41.55 min (minor), 45.31 min (major)
12	AS-H column, 254 nm, 2-propanol: hexane=20:80, 0.5 mL/min; <i>tR</i> =27.86 min (minor), 66.40 min (major)
13	AD-H column, 254 nm, 2-propanol: hexane=20:80, 0.5 mL/min; <i>tR</i> =46.05 min (major), 50.20 min (minor)

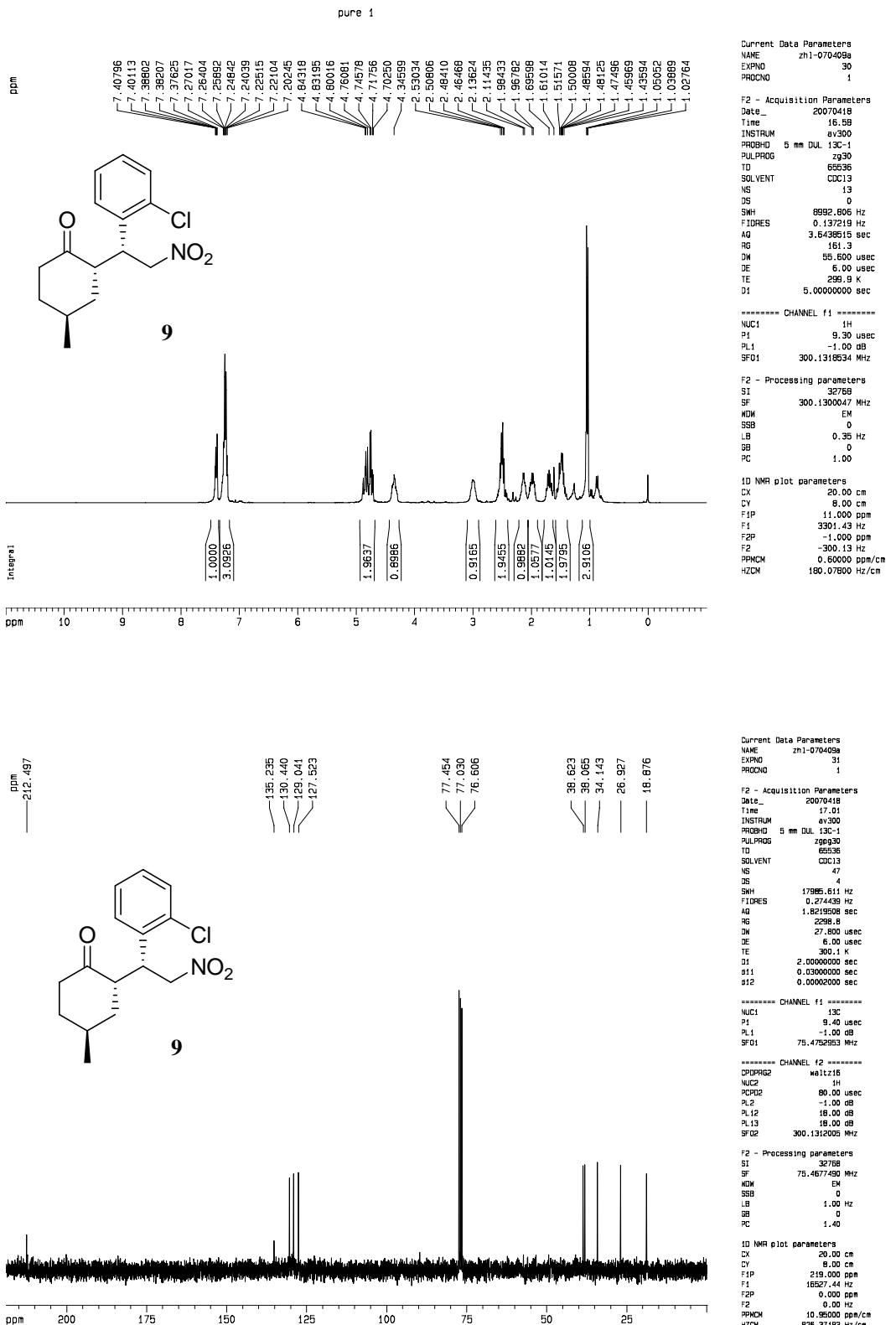
-
- 14** AD-H column, 254 nm, 2-propanol: hexane=5:95, 0.8 mL/min; t_R =
34.56 min (minor), 42.84 min (major)
- 15** AD-H column, 254 nm, 2-propanol: hexane=2:98, 0.8 mL/min; t_R =
74.74 min (major), 82.26 min (minor)
- 16** AS-H column, 254 nm, 2-propanol: hexane=20:80, 0.5 mL/min; t_R =
22.16 min (minor), 36.71 min (major)
- 17** OD-H column, 280 nm, 2-propanol: hexane=20:80, 0.5 mL/min; t_R =
24.98 min (minor), 26.72 min (major)
- 18** AS-H column, 254 nm, 2-propanol: hexane=30:70, 0.5 mL/min; t_R =
15.84 min (minor), 27.94 min (major)
- 19** AD-H column, 254 nm, 2-propanol: hexane=2:98, 0.5 mL/min; t_R =
22.67 min (minor), 31.04 min (major)
- 20** AS-H column, 254 nm, 2-propanol: hexane=30:70, 0.5 mL/min; t_R =
22.83 min (minor), 31.48 min (major)
- 21** AD-H column, 254 nm, 2-propanol: hexane=10:90, 0.5 mL/min; t_R =
37.24 min (major), 39.21 min (minor)
- 22** AD-H column, 254 nm, 2-propanol: hexane=10:90, 0.5 mL/min; t_R =
25.50 min (minor), 33.27 min (major)
-

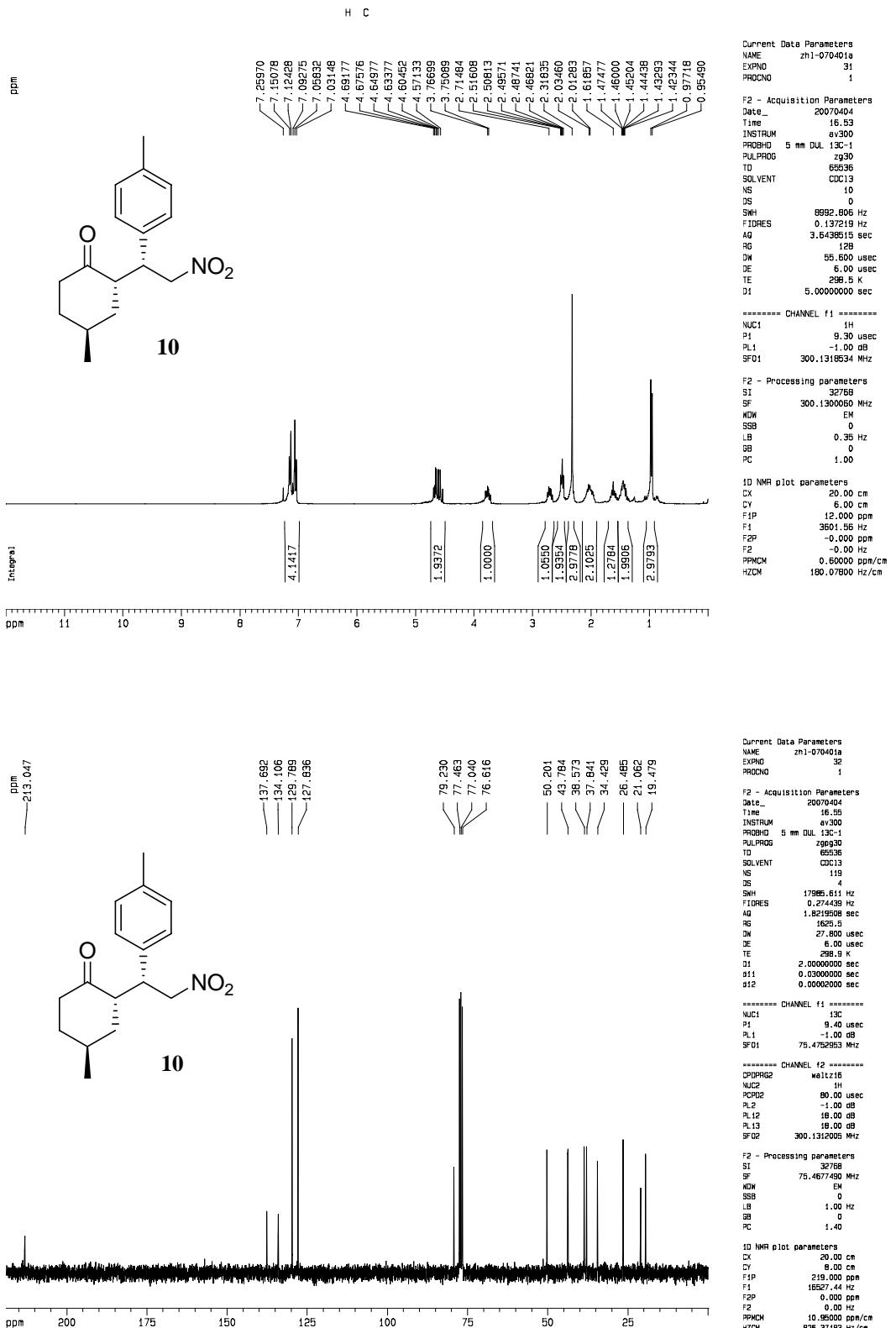
NMR spectra for new compounds:

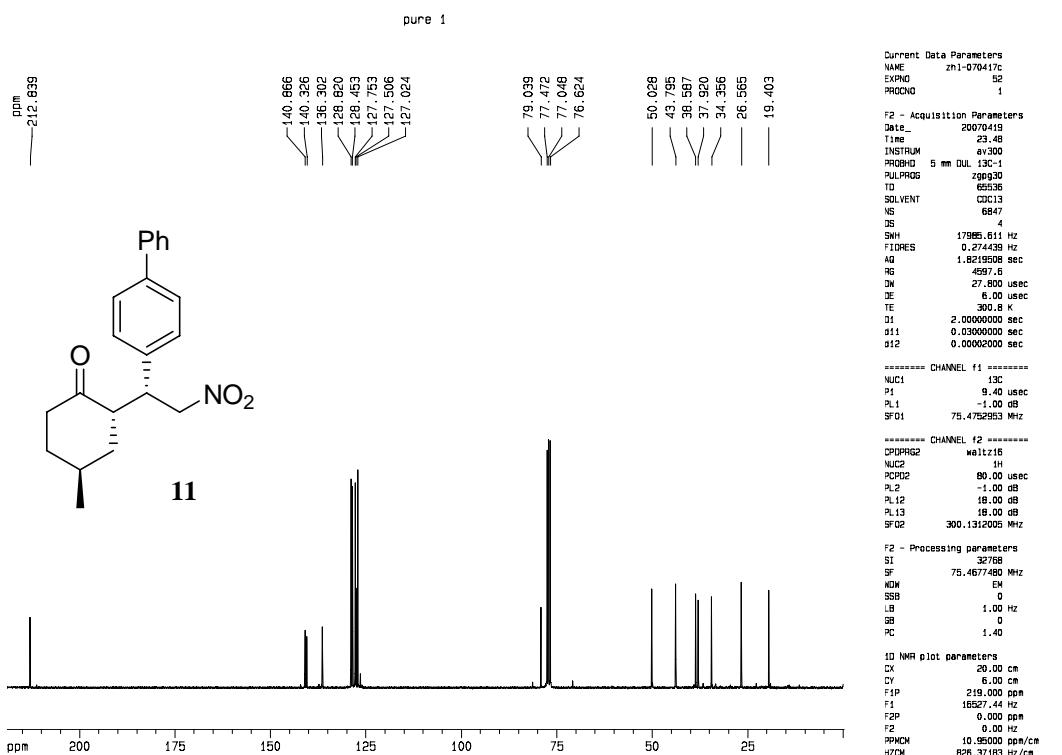
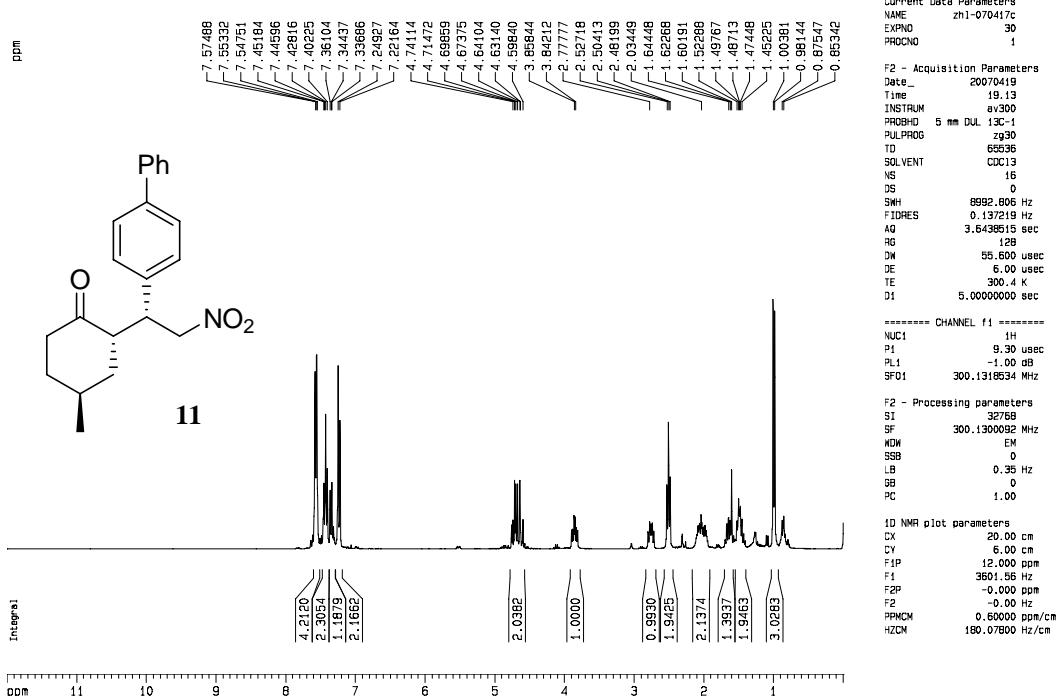


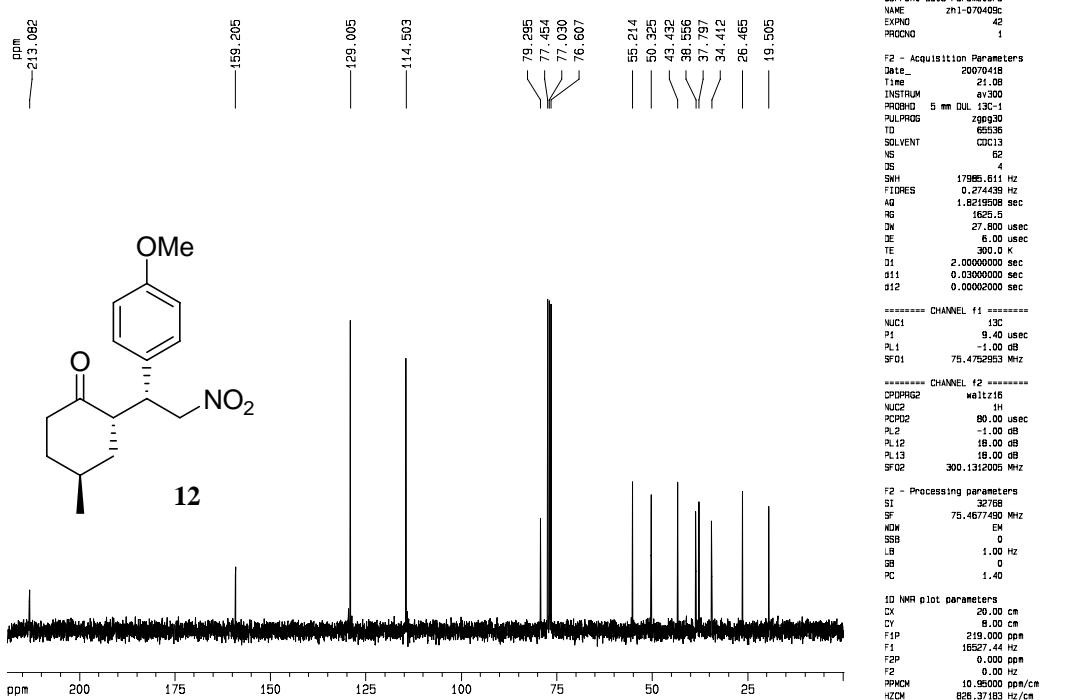
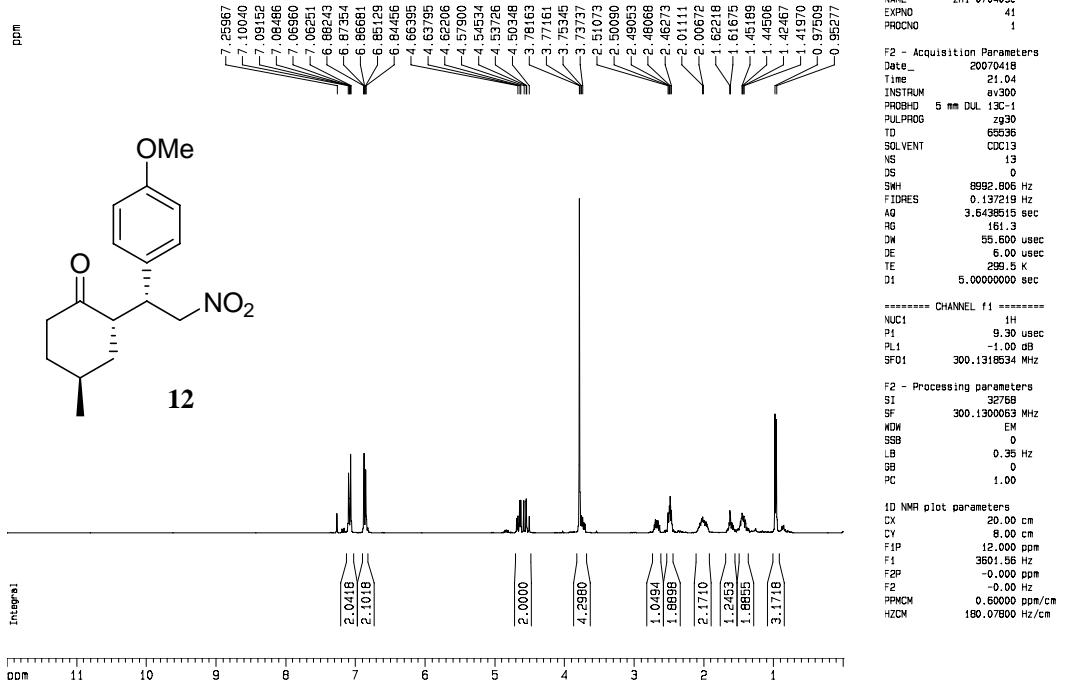


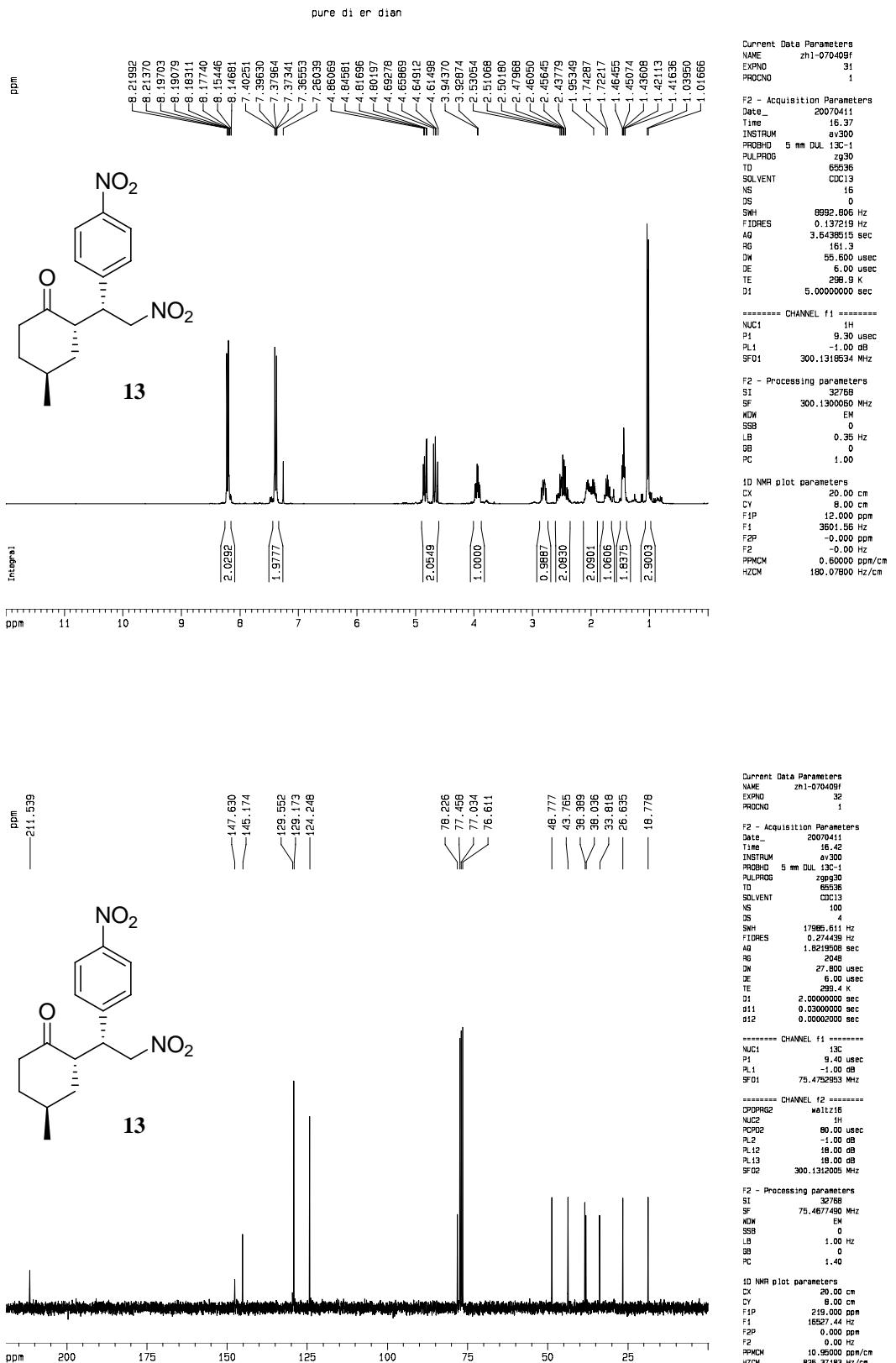


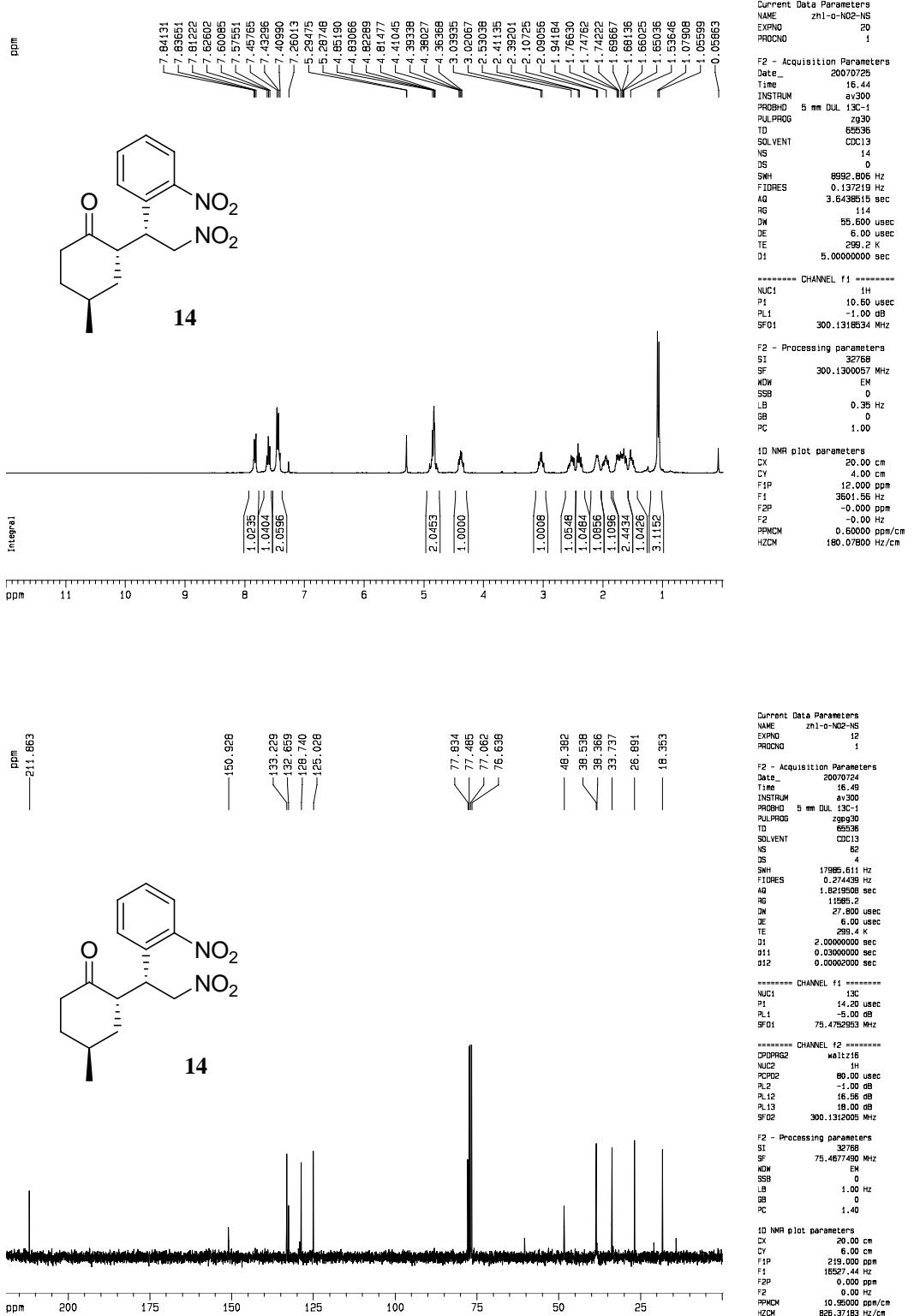


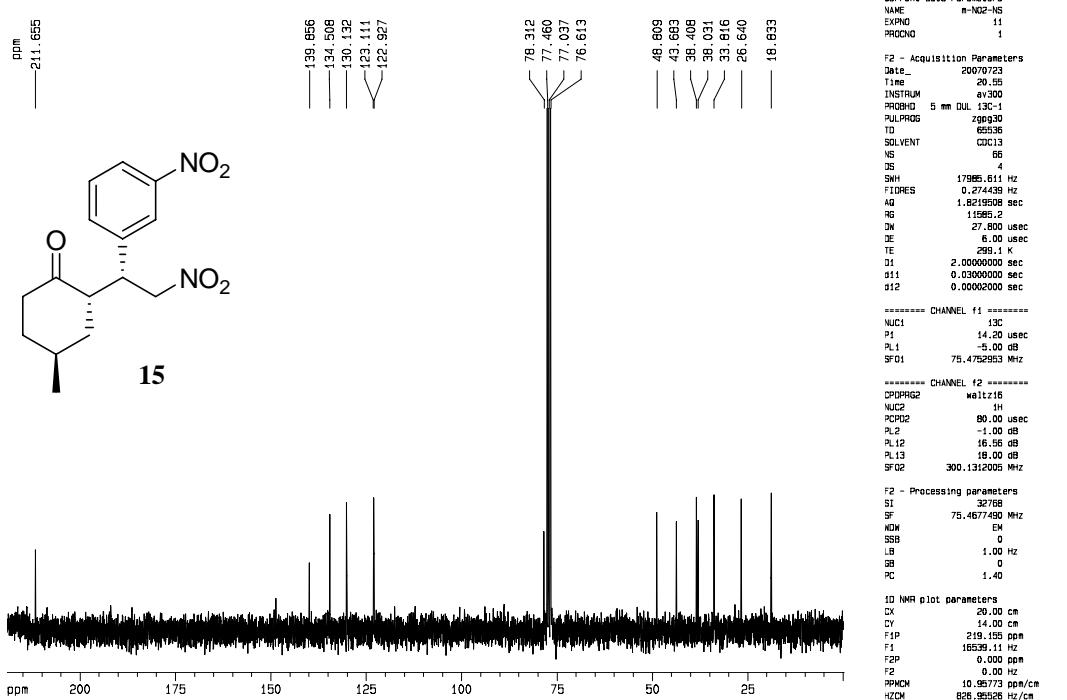
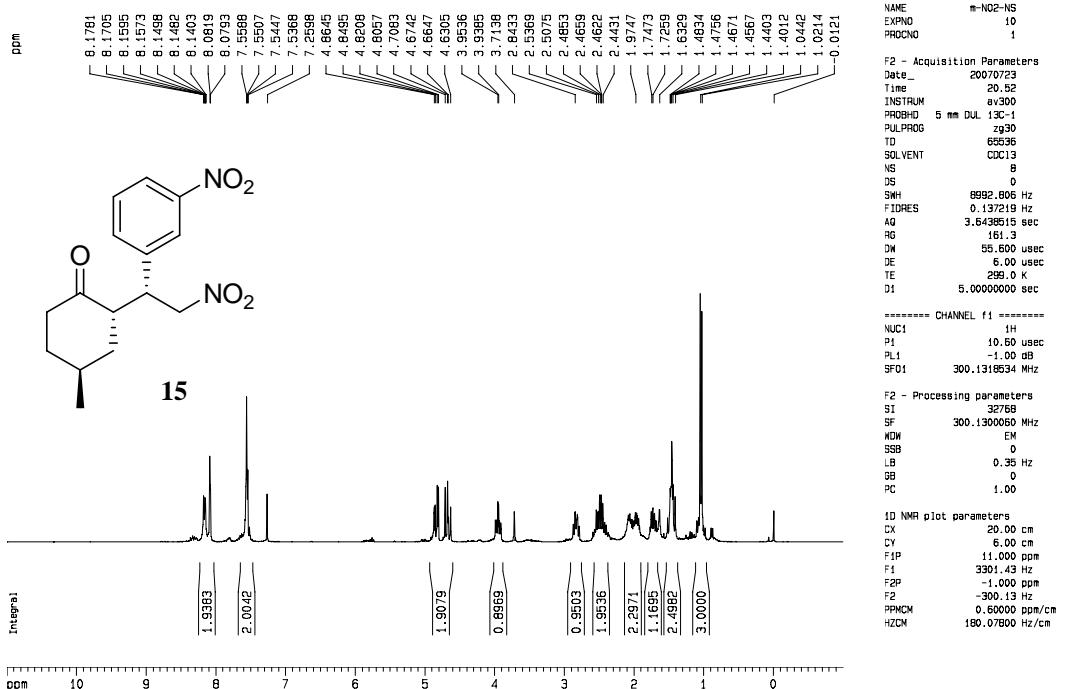


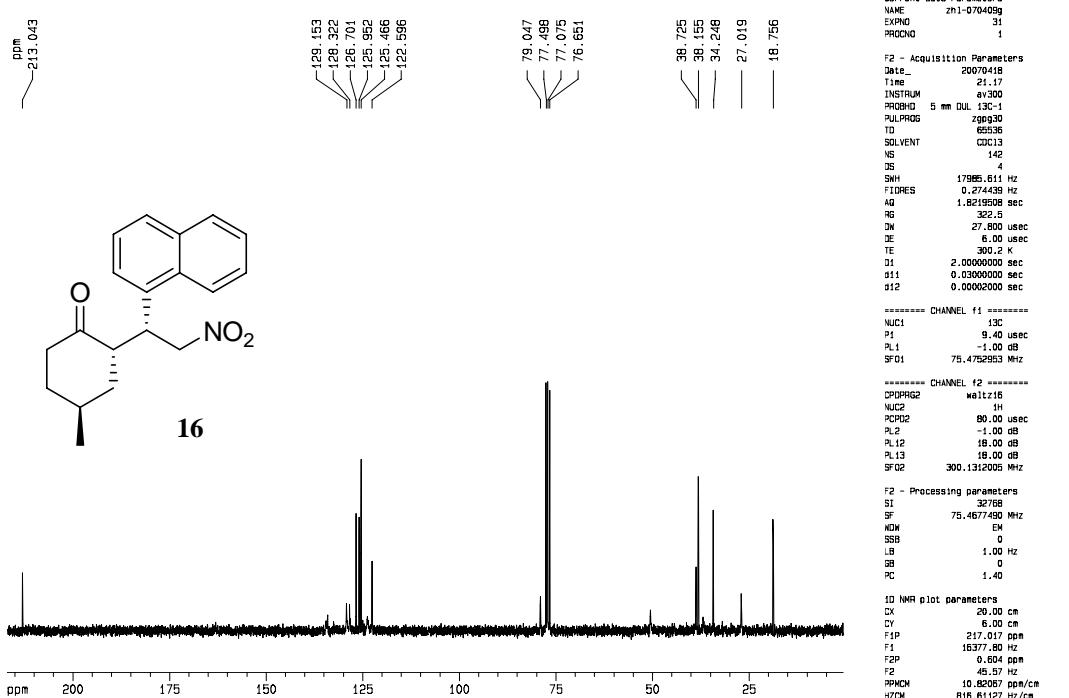
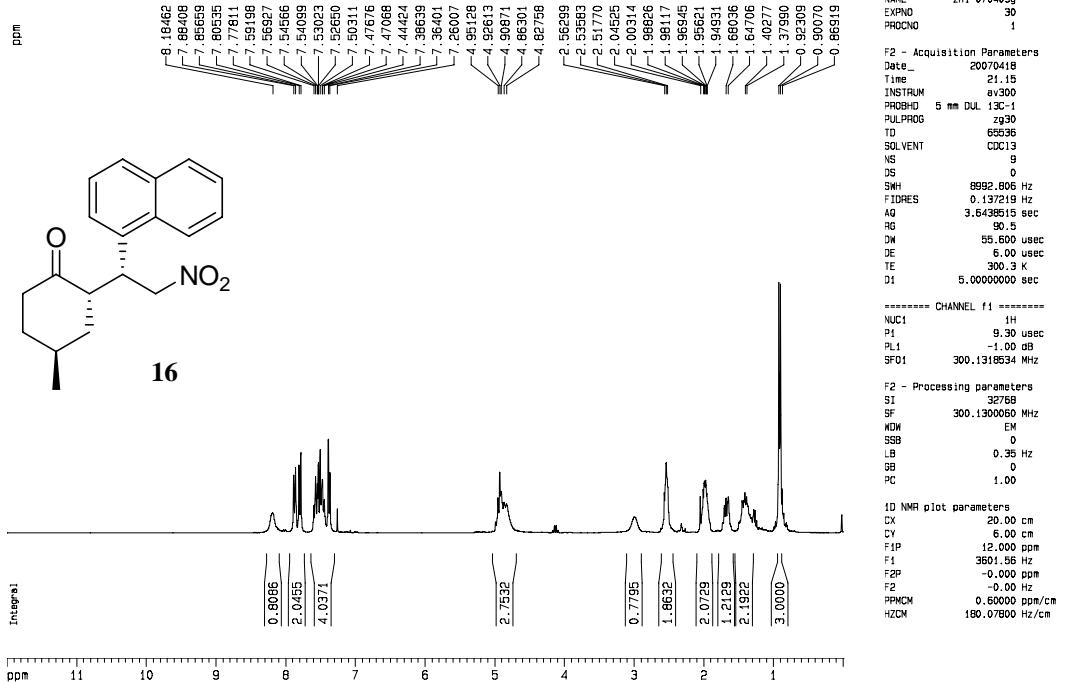


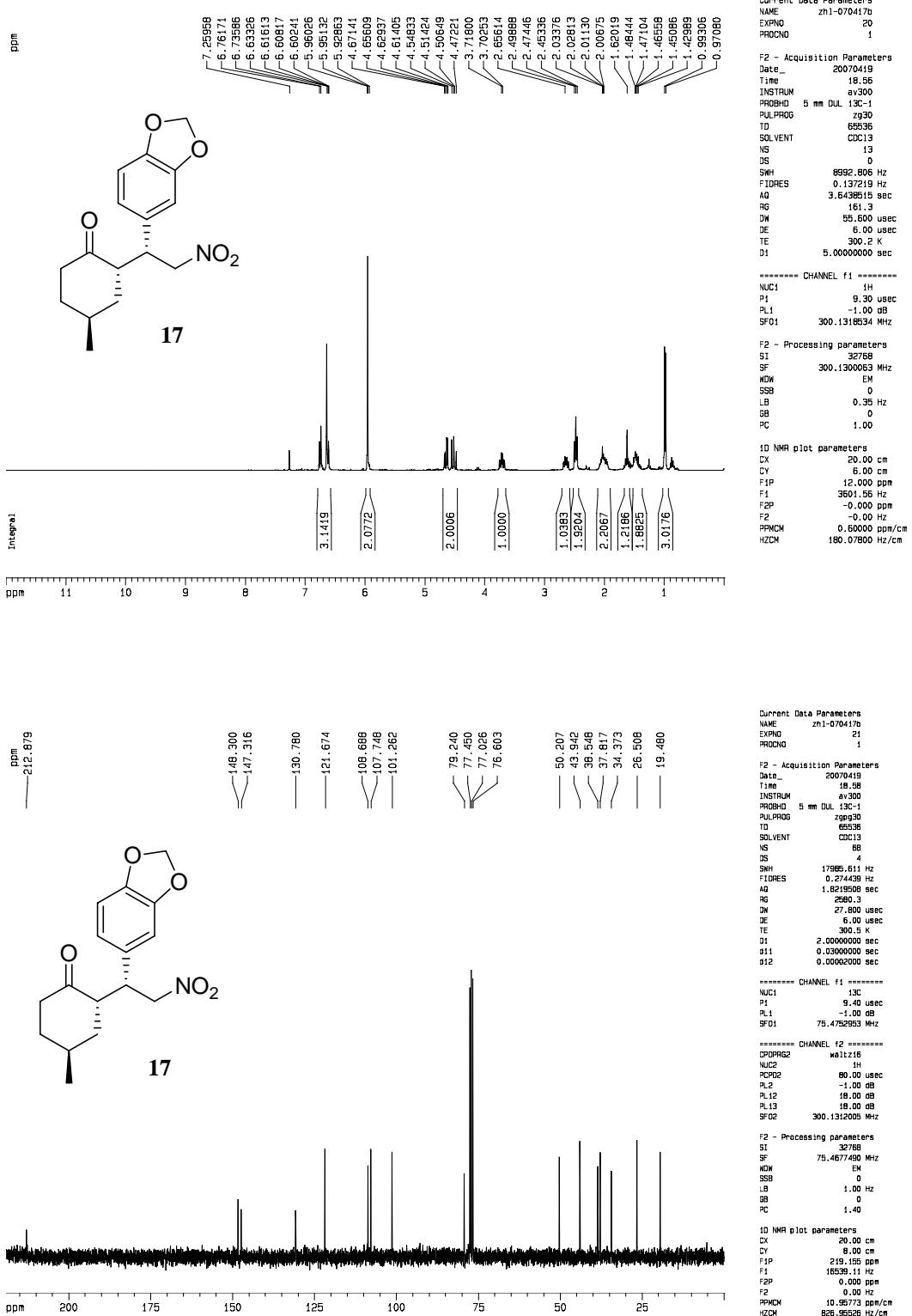


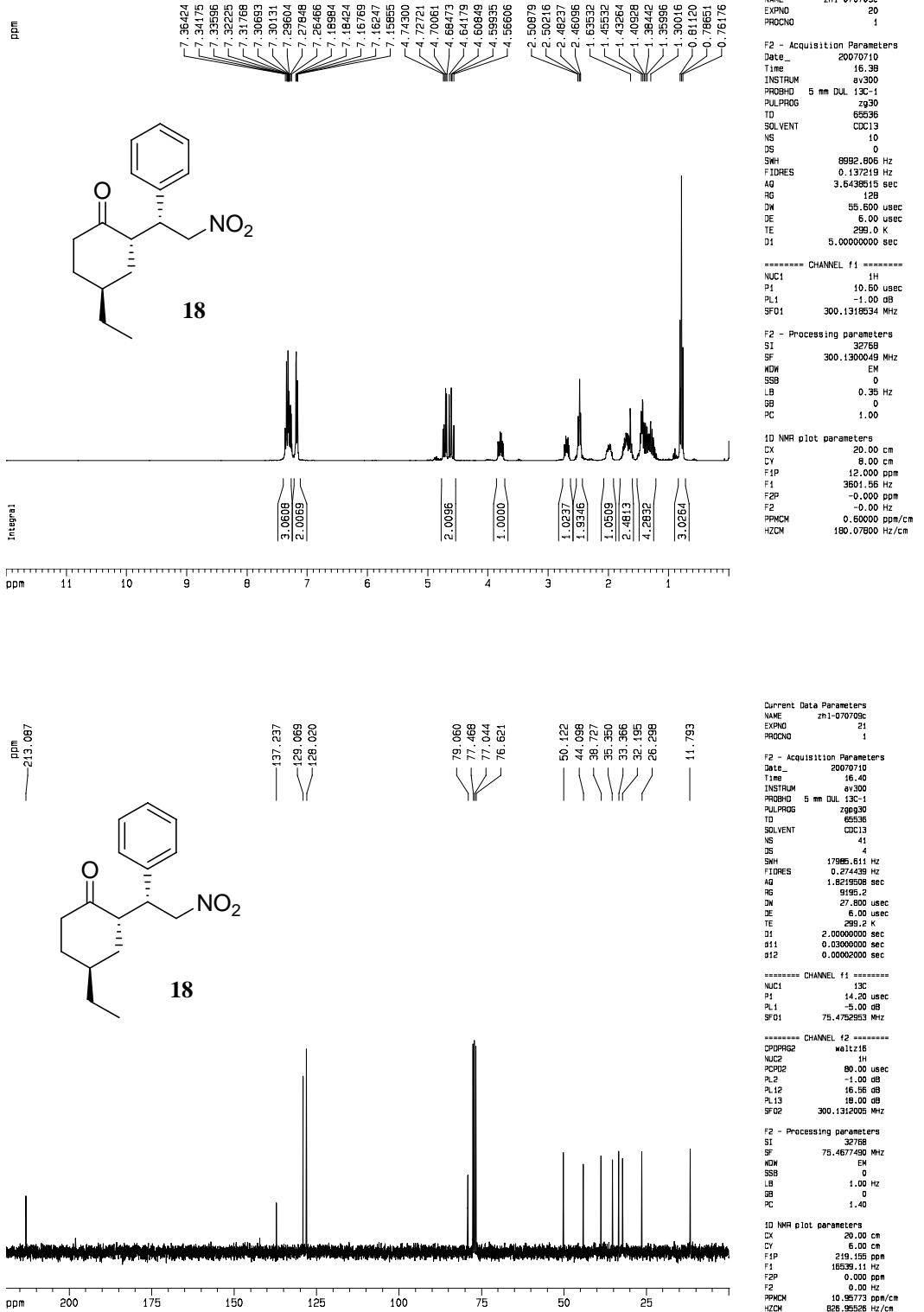


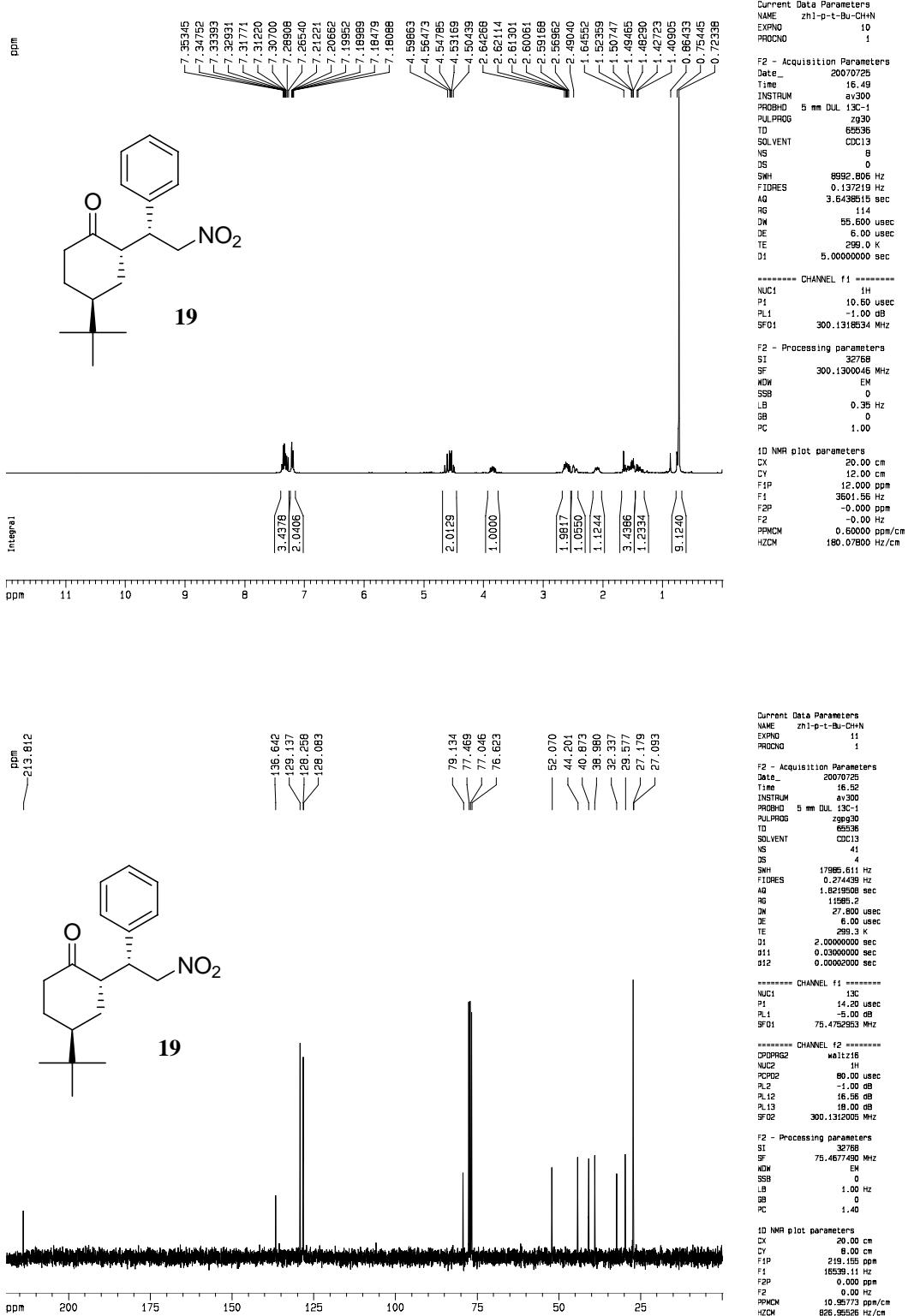


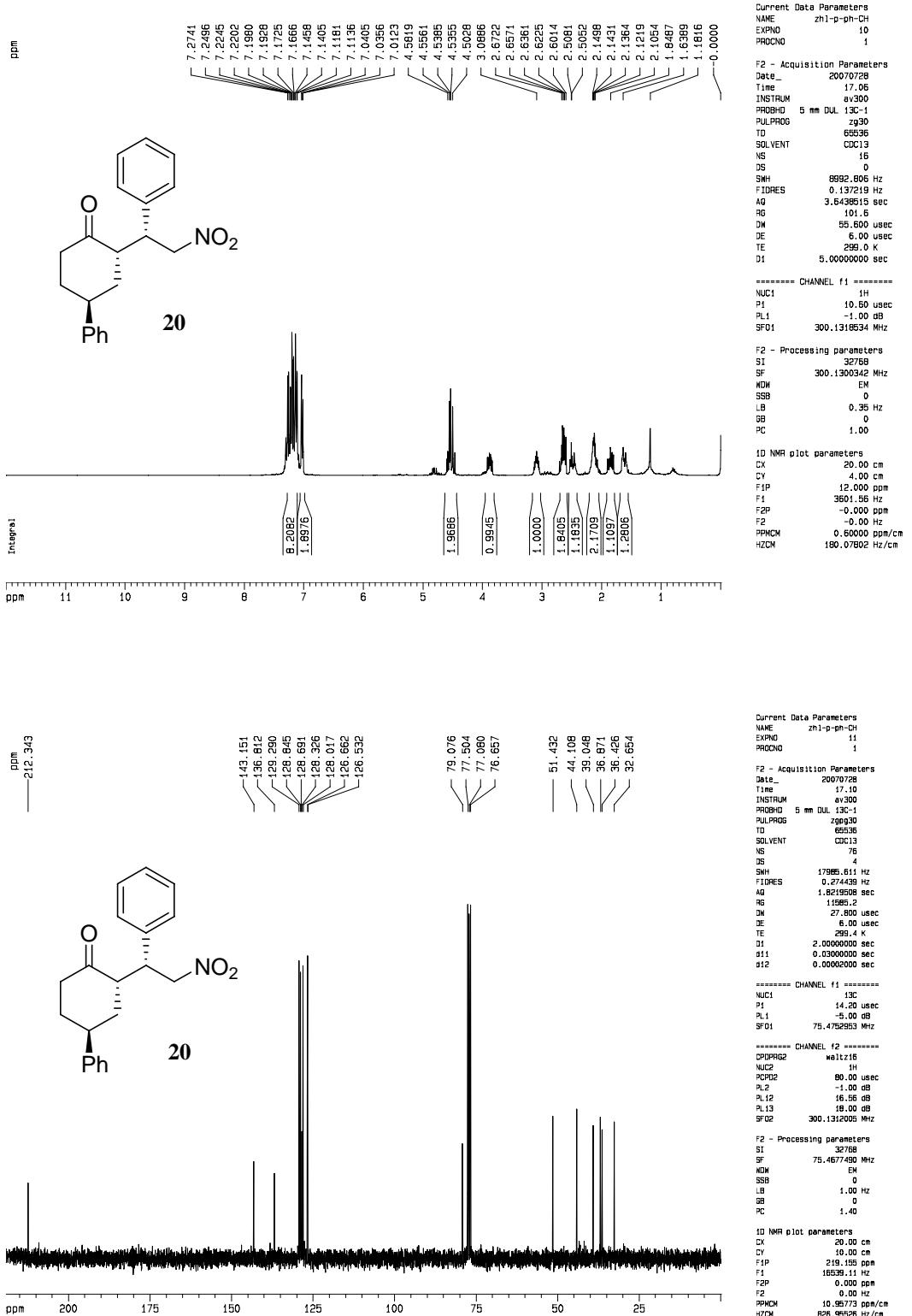


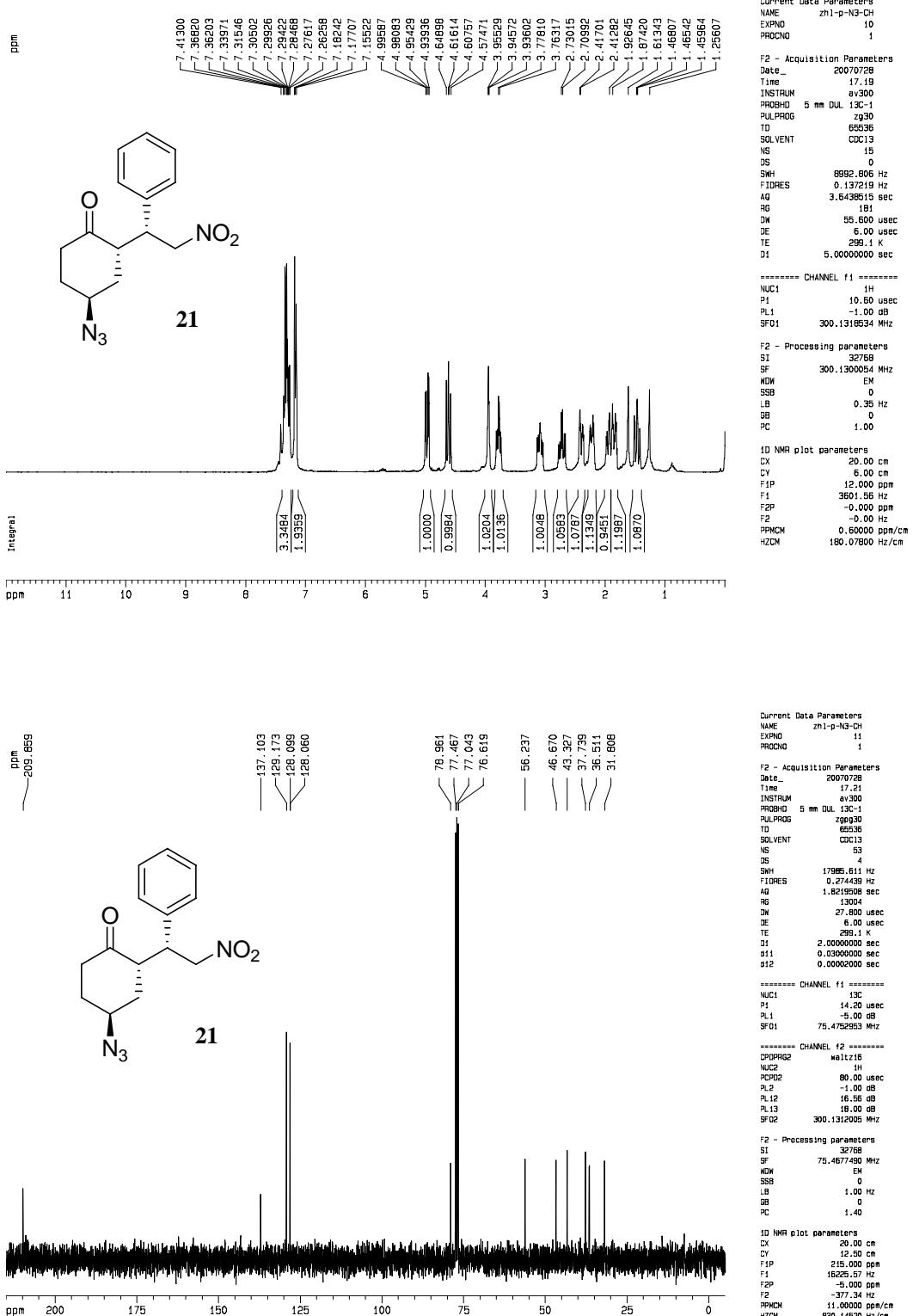


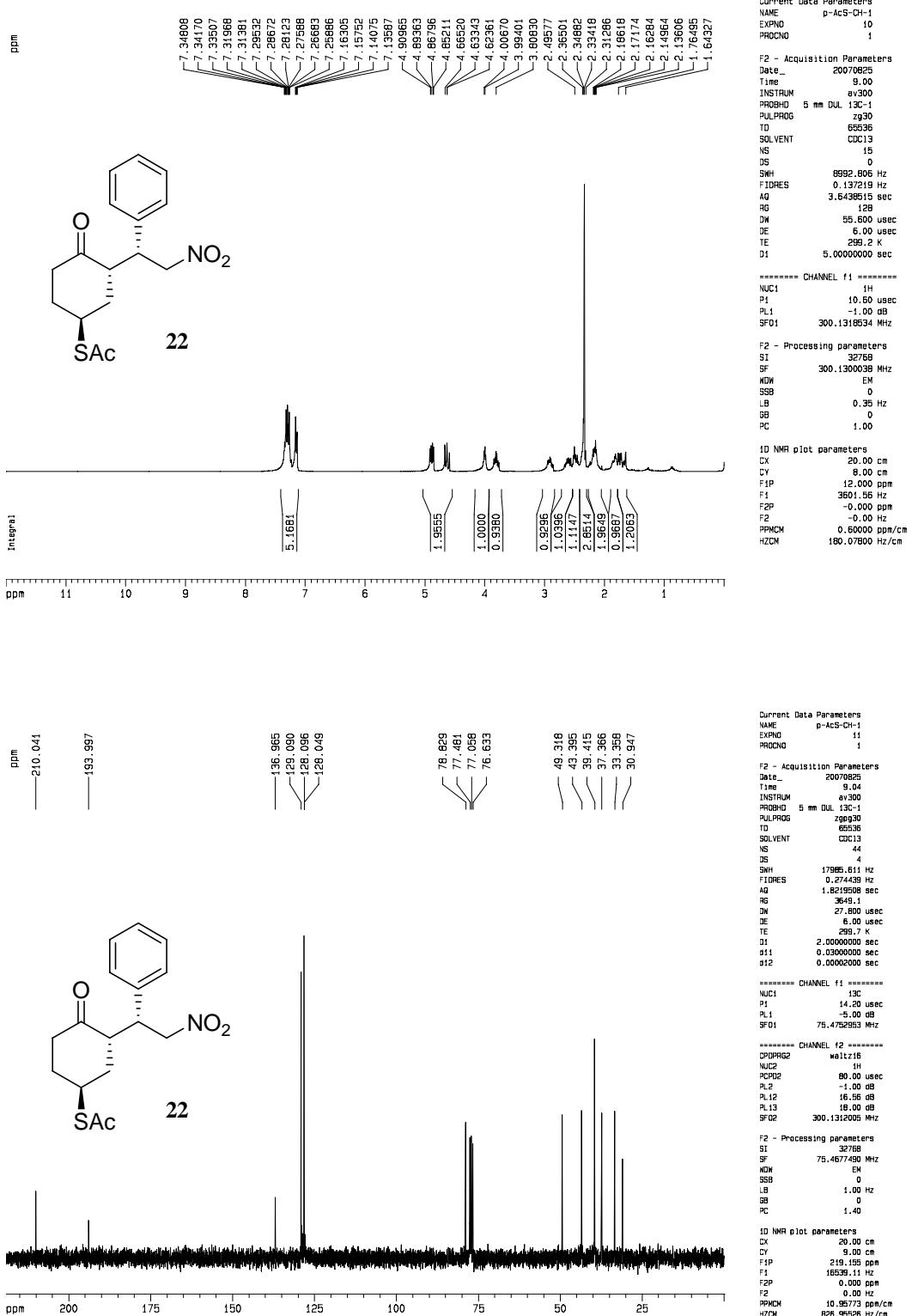






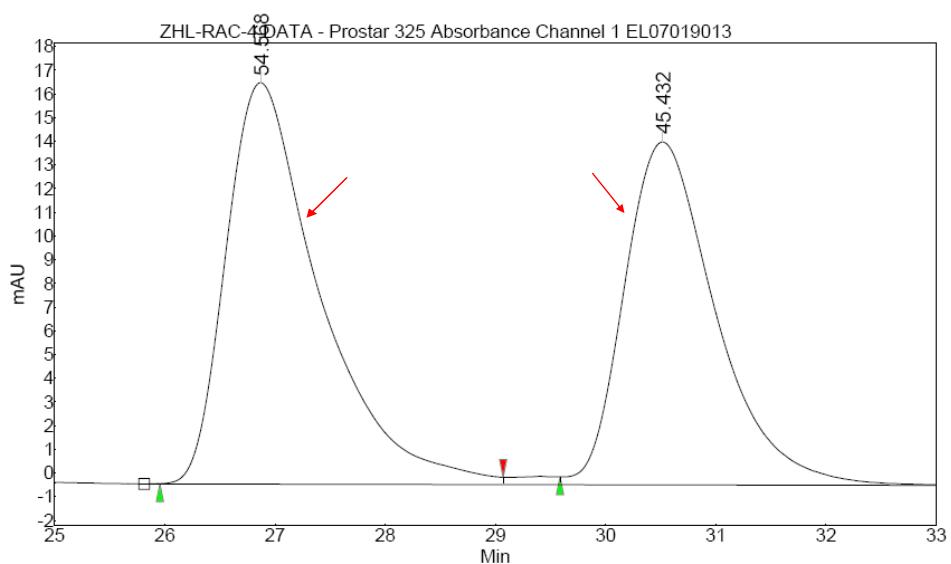
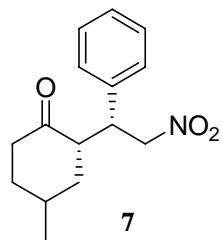






HPLC spectra:

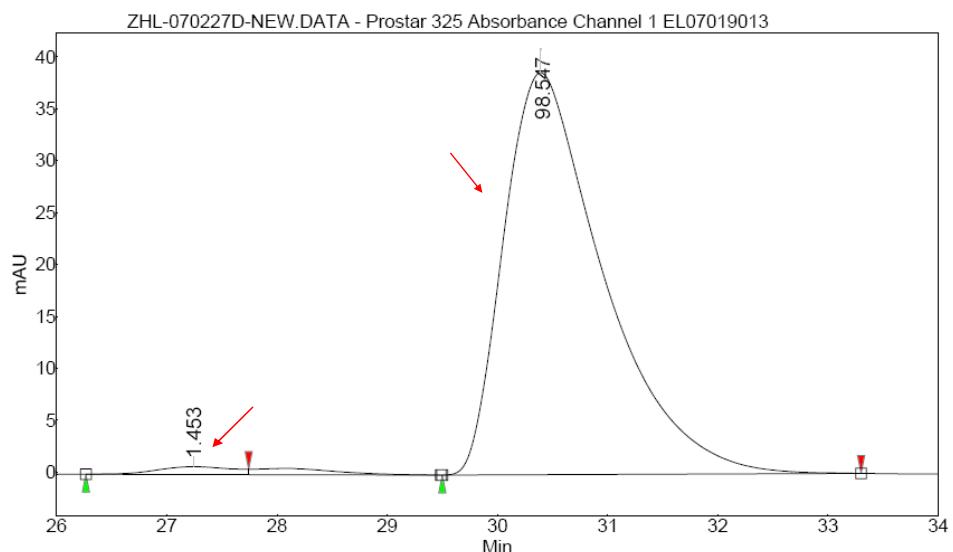
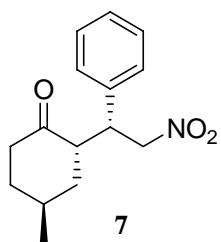
7 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	26.87	54.57	16.9	16.7	54.568
2	UNKNOWN	30.52	45.43	14.5	13.9	45.432
Total			100.00	31.4	30.6	100.000

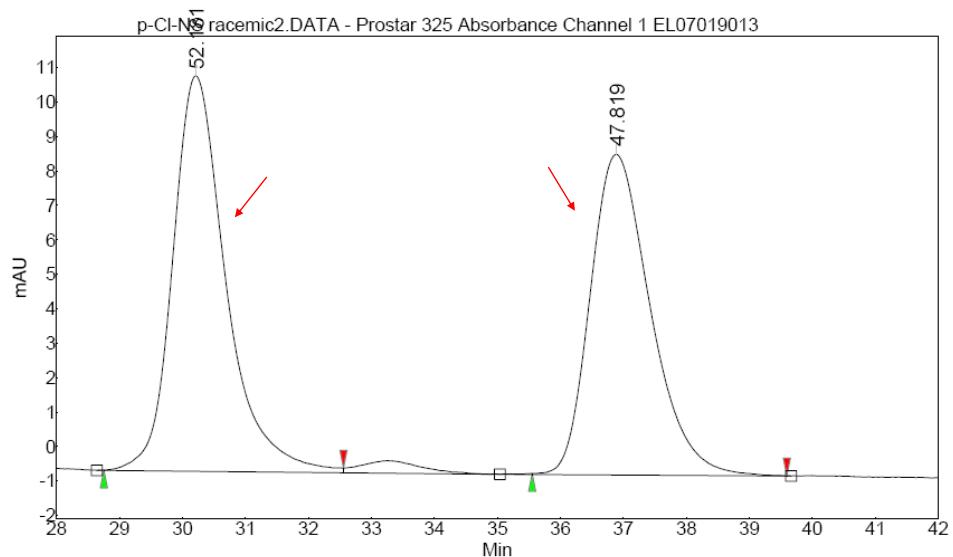
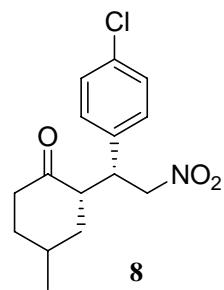
7 (97%ee)



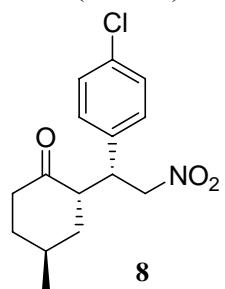
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	27.24	1.45	0.8	0.6	1.453
2	UNKNOWN	30.39	98.55	38.7	40.5	98.547
Total			100.00	39.5	41.1	100.000

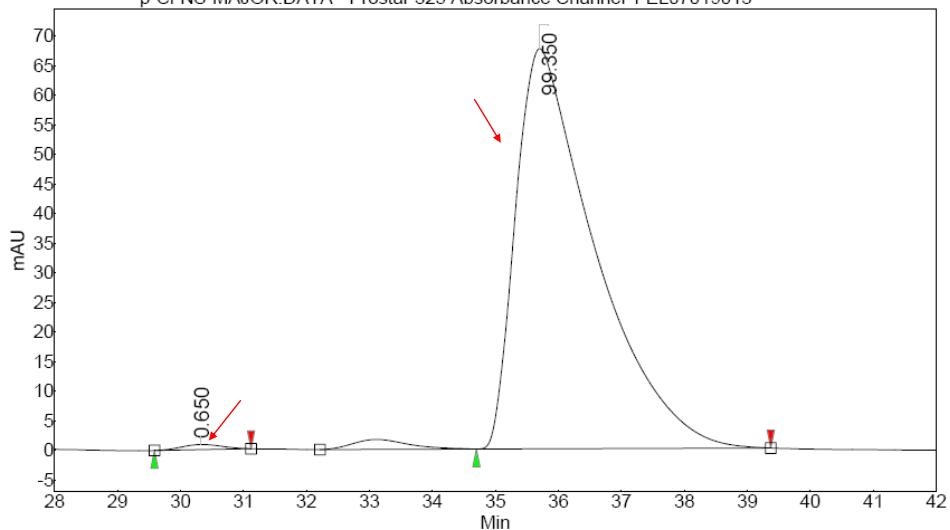
8 (racemic)



8 (99%ee)



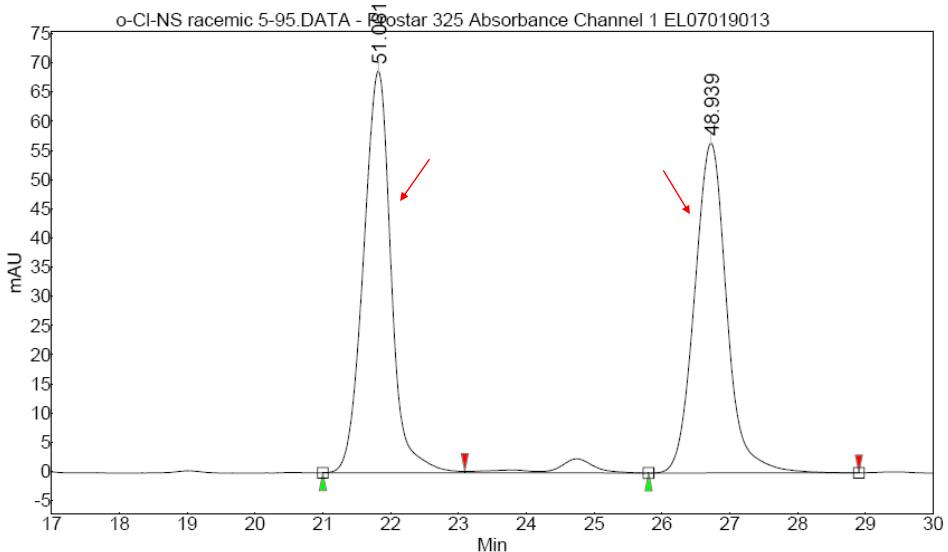
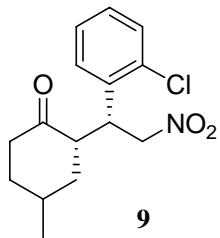
p-Cl-NS-MAJOR.DATA - Prostar 325 Absorbance Channel 1 EL07019013



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	30.32	0.65	0.9	0.6	0.650
2	UNKNOWN	35.70	99.35	67.6	98.5	99.350
Total			100.00	68.4	99.1	100.000

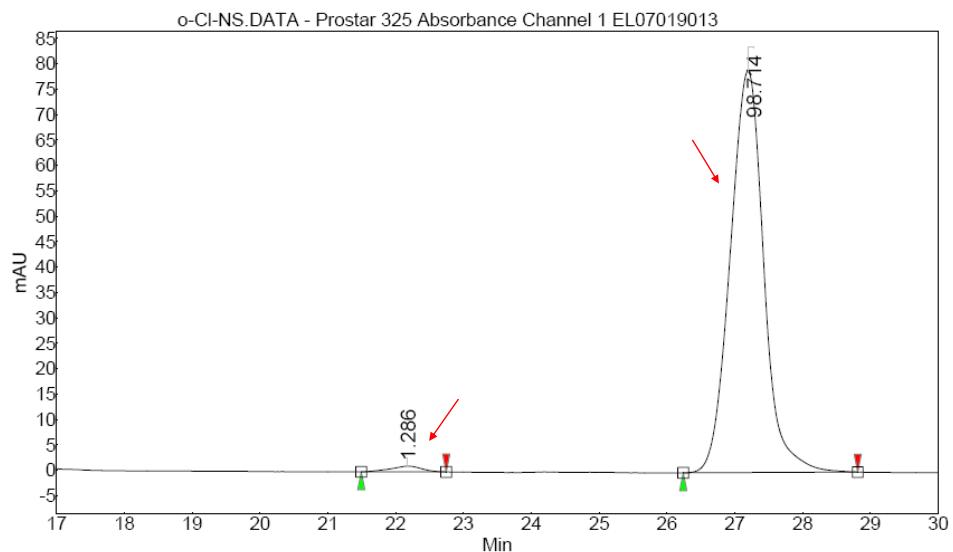
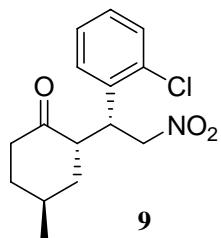
9 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	21.82	51.06	68.8	32.4	51.061
2	UNKNOWN	26.72	48.94	56.5	31.1	48.939
Total			100.00	125.3	63.5	100.000

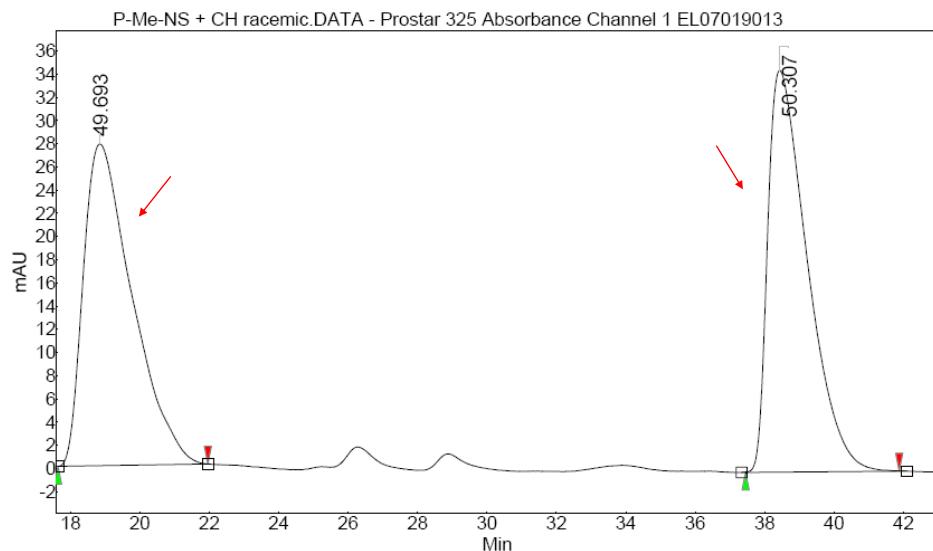
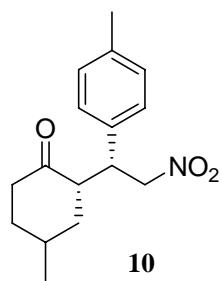
9 (97%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	22.17	1.29	1.1	0.6	1.286
2	UNKNOWN	27.20	98.71	79.0	45.3	98.714
Total			100.00	80.1	45.9	100.000

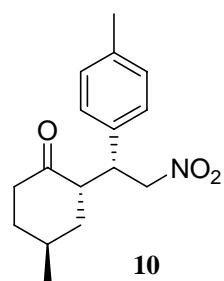
10 (racemic)



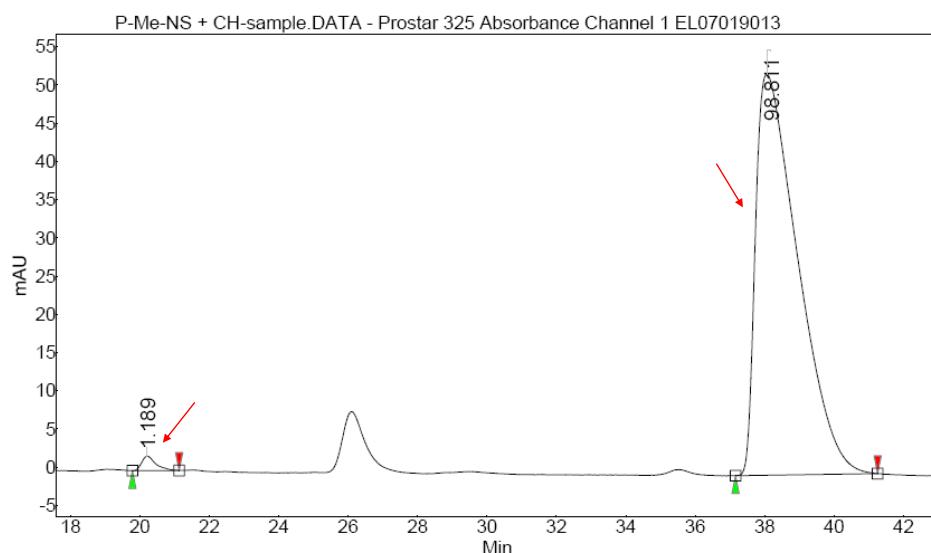
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	18.85	49.69	27.7	45.1	49.693
2	UNKNOWN	38.43	50.31	34.6	45.6	50.307
Total			100.00	62.4	90.7	100.000

10 (98%ee)



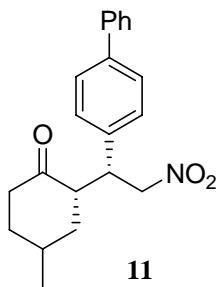
10



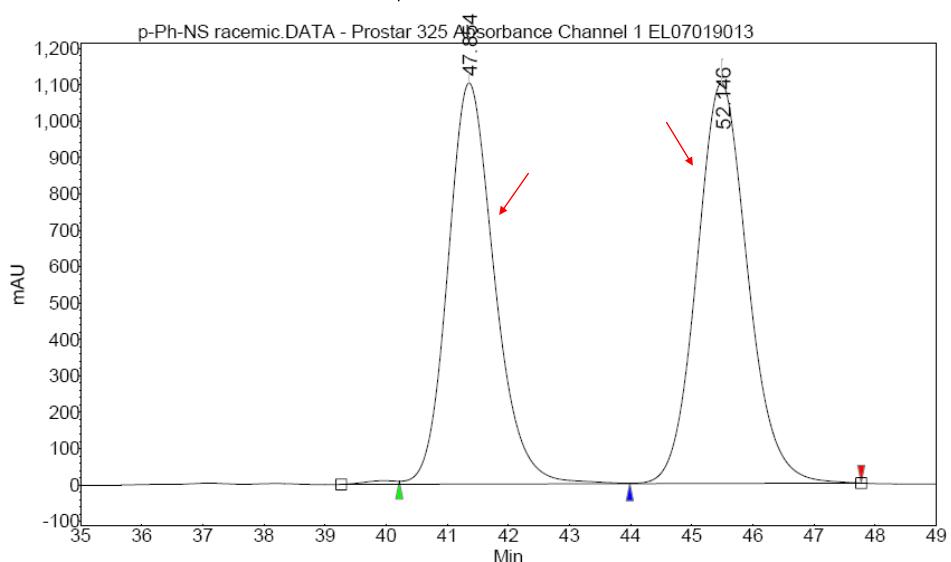
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	20.21	1.19	1.9	0.9	1.189
2	UNKNOWN	38.06	98.81	52.5	73.8	98.811
Total			100.00	54.4	74.6	100.000

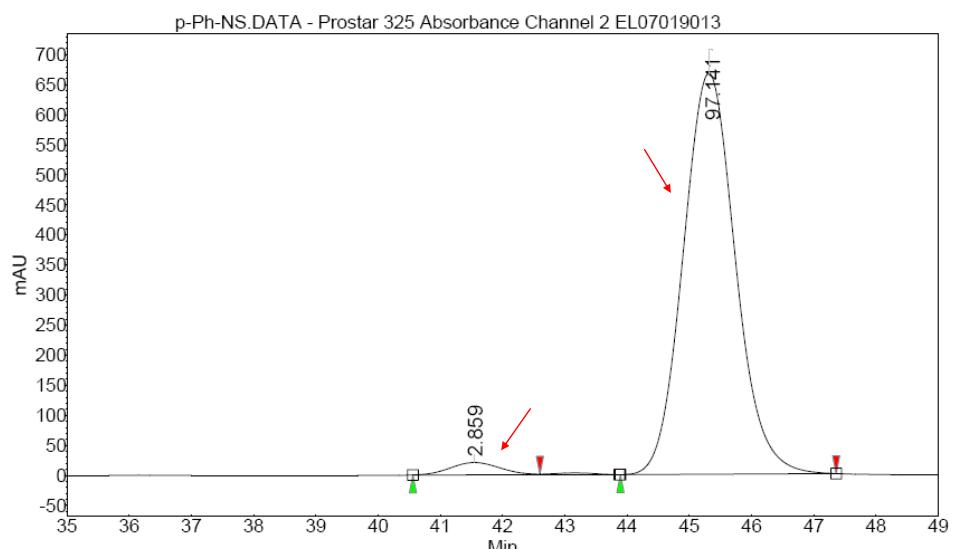
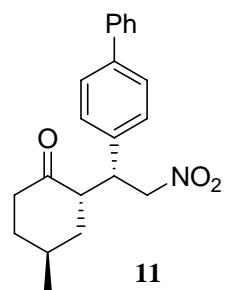
11 (racemic)



11



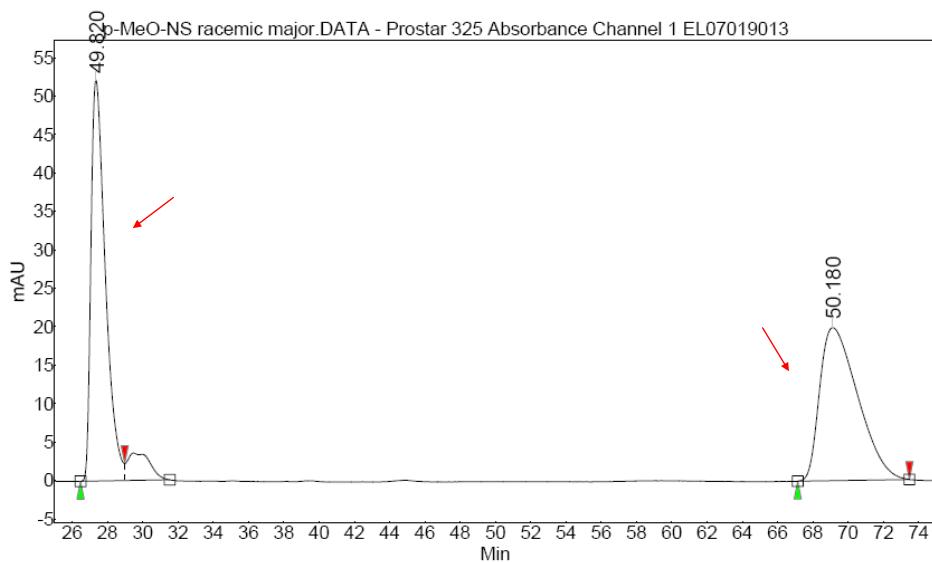
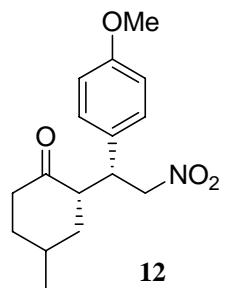
11 (94%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	41.55	2.86	20.5	19.0	2.859
2	UNKNOWN	45.31	97.14	666.8	646.9	97.141
Total			100.00	687.4	665.9	100.000

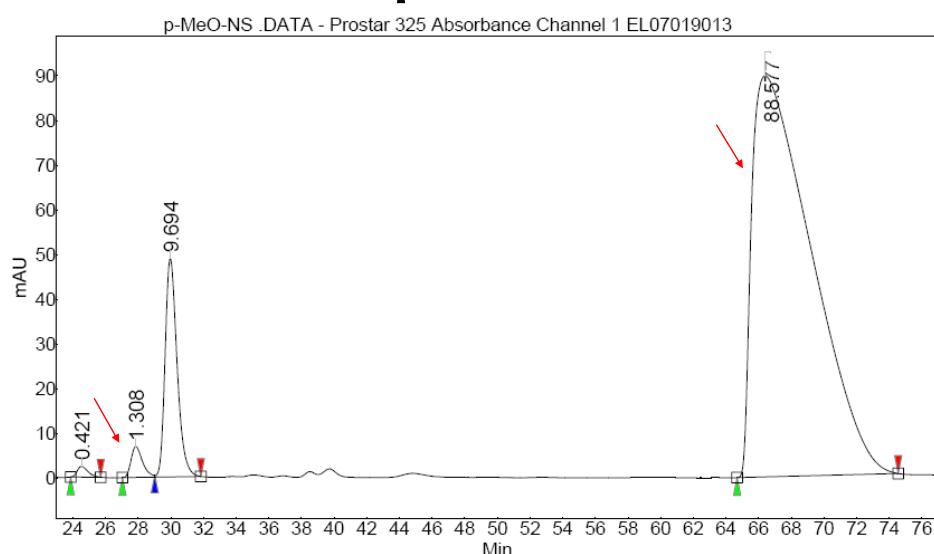
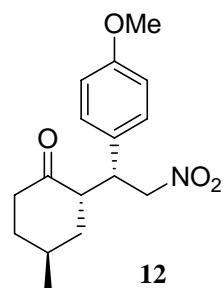
12 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	27.35	49.82	52.2	49.3	49.820
2	UNKNOWN	69.12	50.18	19.9	49.7	50.180
Total			100.00	72.1	99.0	100.000

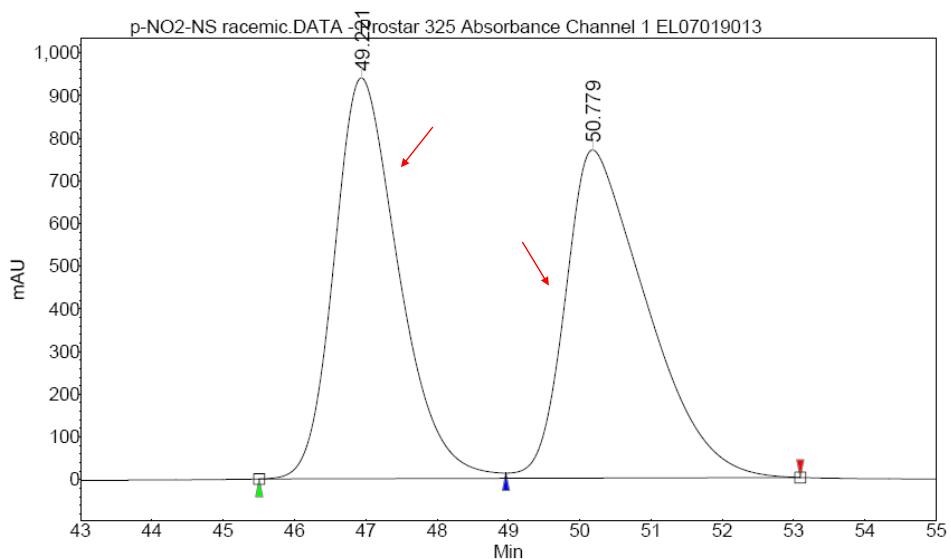
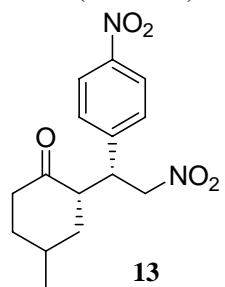
12 (97%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	24.53	0.42	2.4	1.8	0.421
2	UNKNOWN	27.86	1.31	6.9	5.6	1.308
3	UNKNOWN	29.97	9.69	48.8	41.4	9.694
4	UNKNOWN	66.40	88.58	89.6	378.0	88.577
Total			100.00	147.7	426.8	100.000

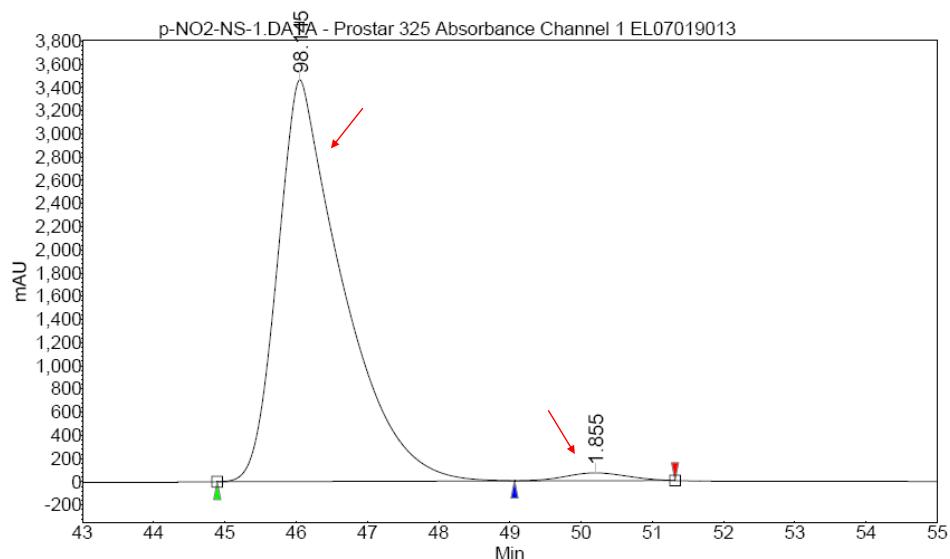
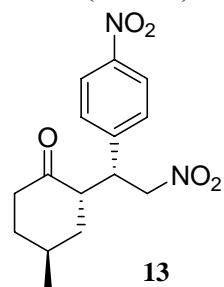
13 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	46.94	49.22	939.0	984.2	49.221
2	UNKNOWN	50.18	50.78	768.8	1015.4	50.779
Total			100.00	1707.8	1999.6	100.000

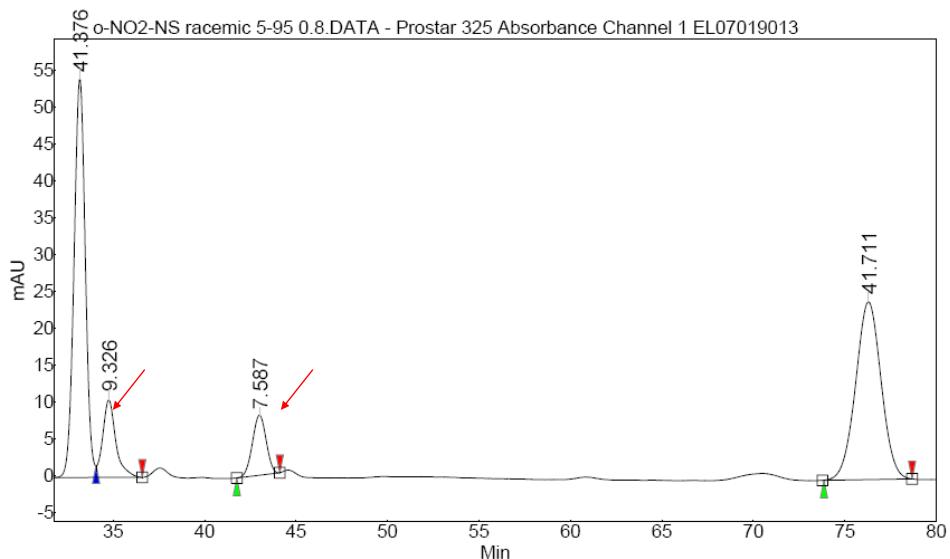
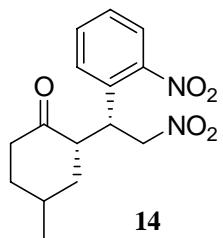
13 (98%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	46.05	98.14	3463.0	3661.0	98.145
2	UNKNOWN	50.20	1.86	68.0	69.2	1.855
Total			100.00	3531.1	3730.2	100.000

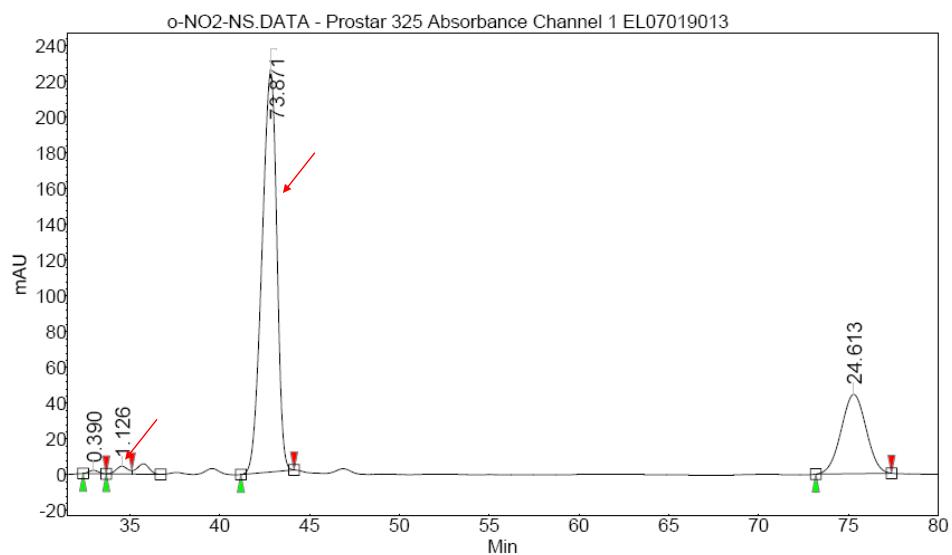
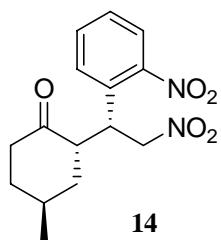
14 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	33.18	41.38	54.0	38.6	41.376
2	UNKNOWN	34.77	9.33	10.5	8.7	9.326
3	UNKNOWN	43.00	7.59	8.1	7.1	7.587
4	UNKNOWN	76.29	41.71	24.1	38.9	41.711
Total			100.00	96.8	93.3	100.000

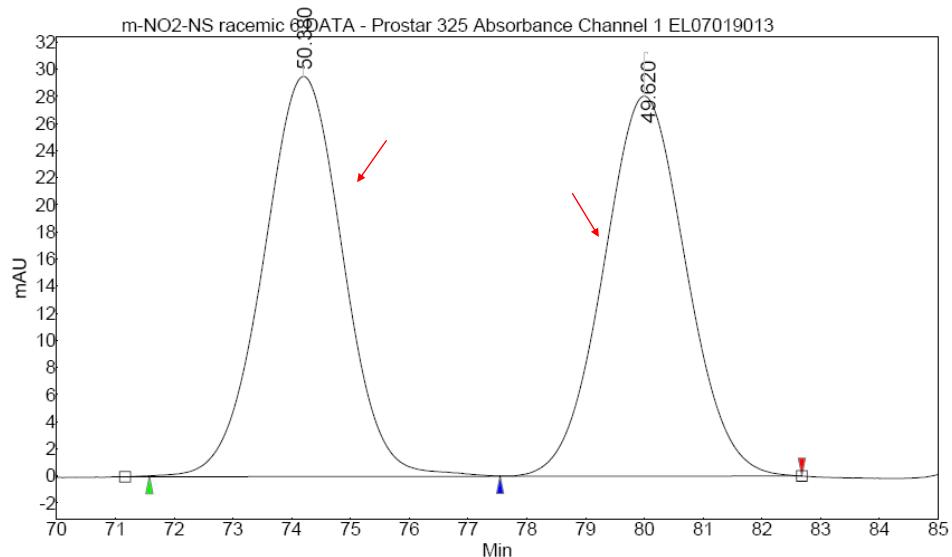
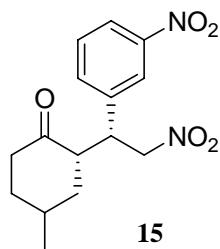
14 (97%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	32.98	0.39	1.9	1.1	0.390
2	UNKNOWN	34.56	1.13	4.3	3.3	1.126
3	UNKNOWN	42.84	73.87	223.3	214.5	73.871
4	UNKNOWN	75.29	24.61	44.3	71.5	24.613
Total			100.00	273.9	290.4	100.000

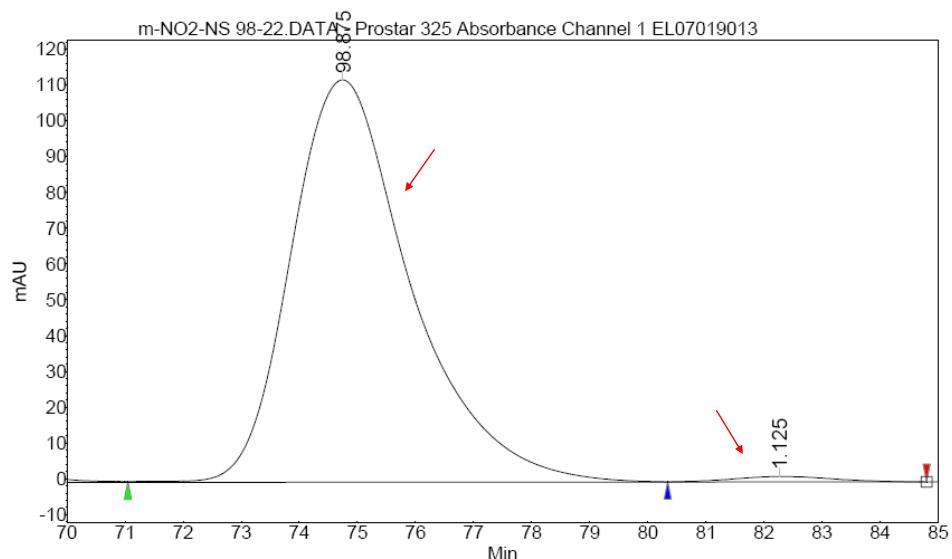
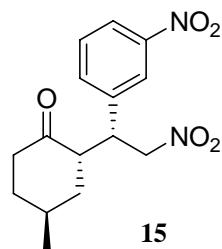
15 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	74.20	50.38	29.5	46.4	50.380
2	UNKNOWN	80.00	49.62	28.0	45.7	49.620
Total			100.00	57.6	92.2	100.000

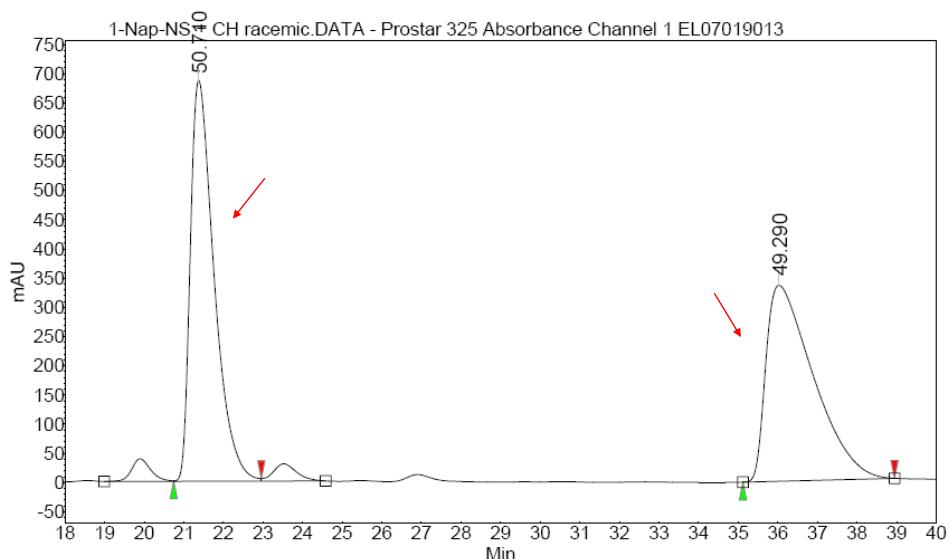
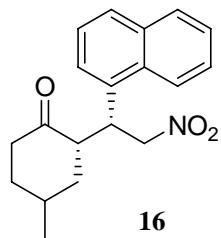
15 (98%ee)



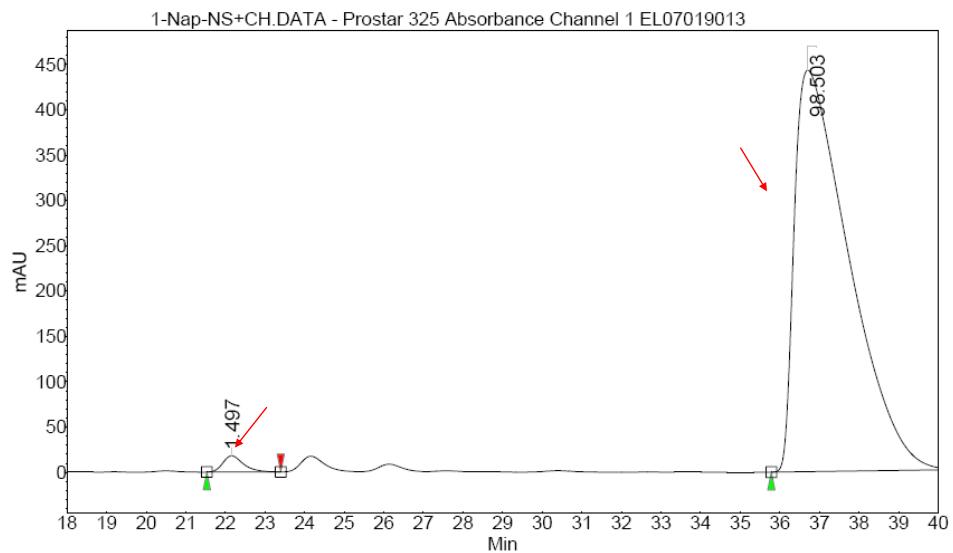
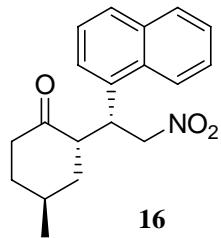
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	74.74	98.87	112.4	268.7	98.875
2	UNKNOWN	82.26	1.13	1.5	3.1	1.125
Total			100.00	113.9	271.8	100.000

16 (racemic)



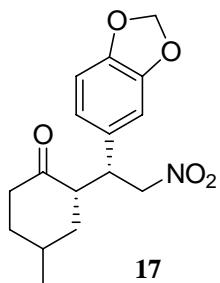
16 (97%ee)



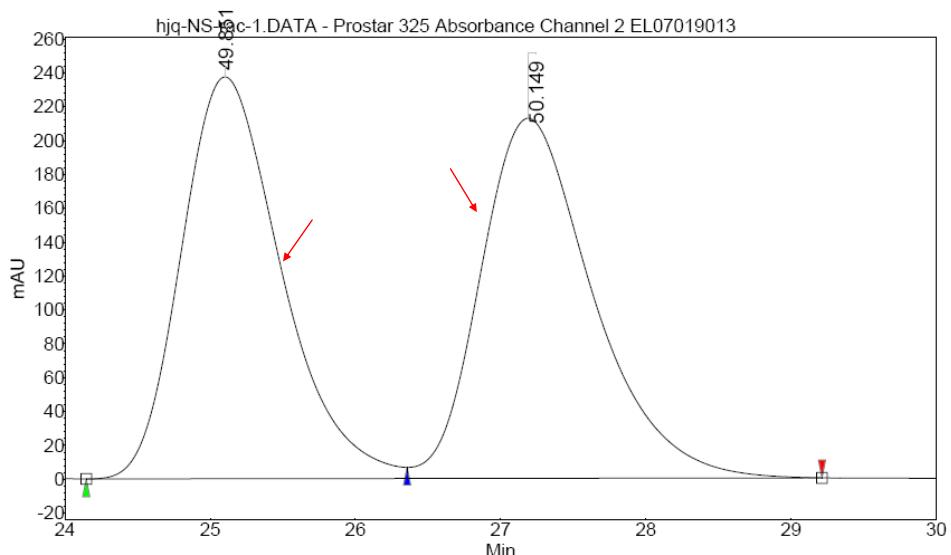
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	22.16	1.50	17.9	10.7	1.497
2	UNKNOWN	36.71	98.50	442.9	705.2	98.503
Total			100.00	460.8	715.9	100.000

17 (racemic)



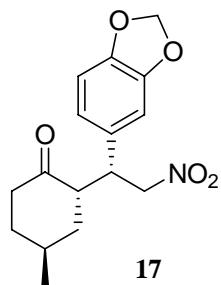
17



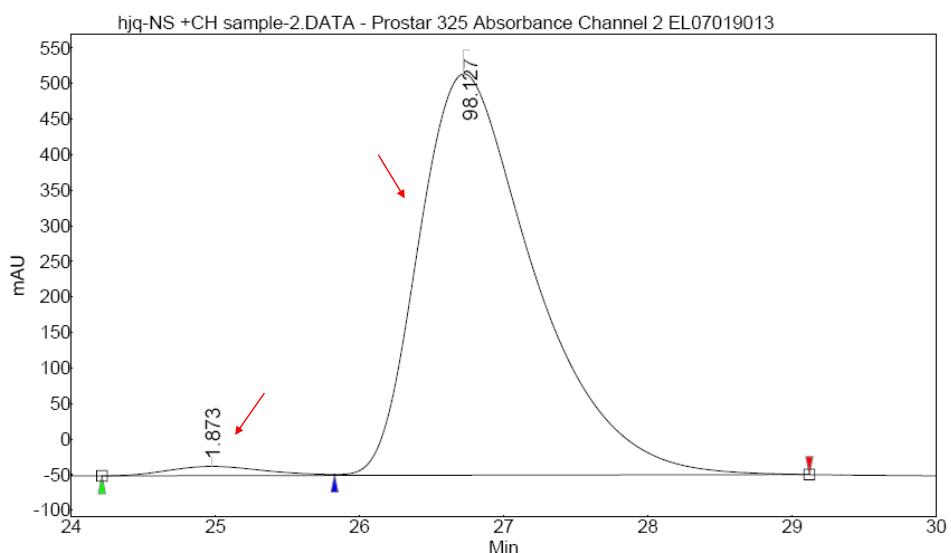
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	25.10	49.85	237.2	189.0	49.851
2	UNKNOWN	27.19	50.15	212.6	190.1	50.149
Total			100.00	449.8	379.1	100.000

17 (96%ee)



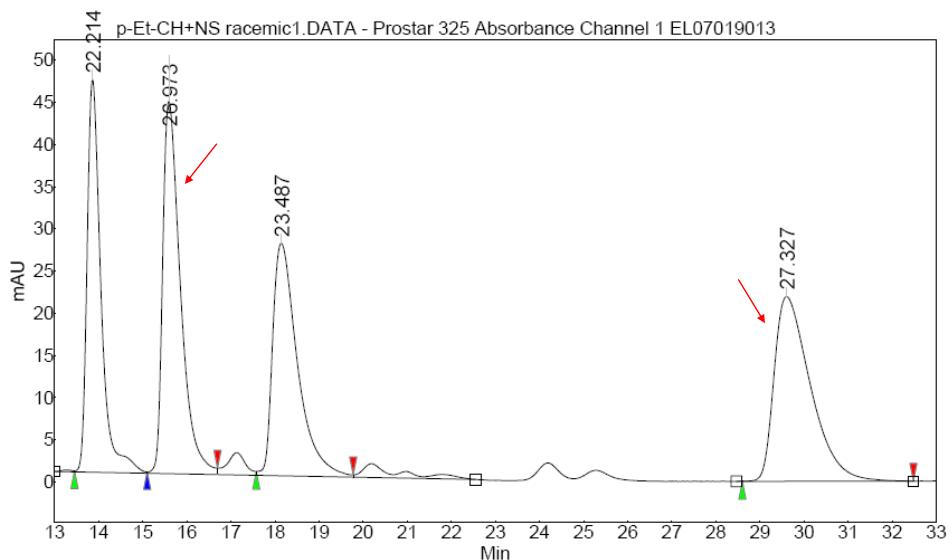
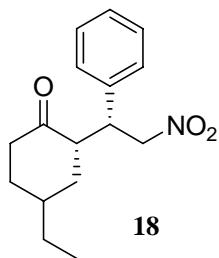
17



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	24.98	1.87	12.9	10.0	1.873
2	UNKNOWN	26.72	98.13	564.2	523.3	98.127
Total			100.00	577.2	533.3	100.000

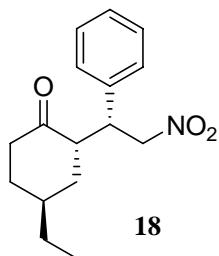
18 (racemic)



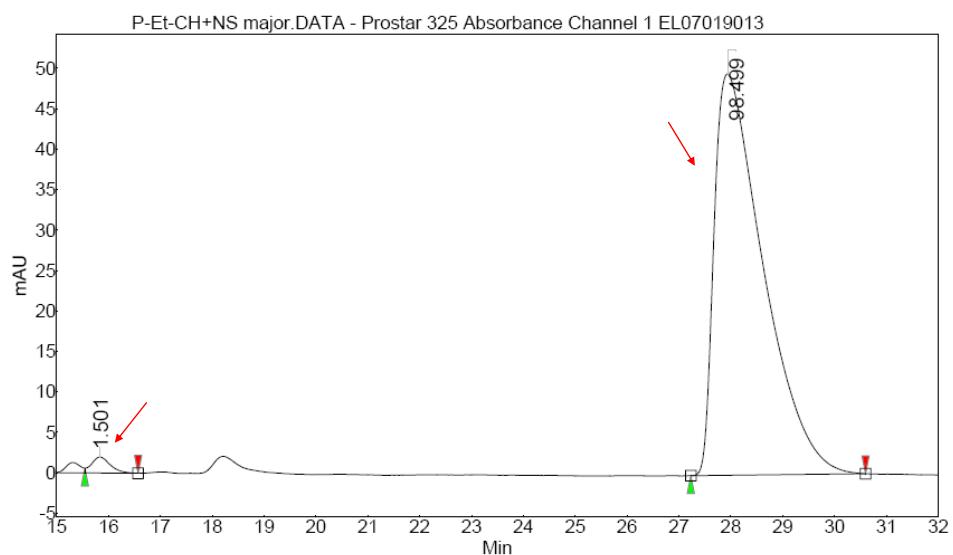
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	13.86	22.21	46.6	17.0	22.214
2	UNKNOWN	15.59	26.97	44.1	20.6	26.973
3	UNKNOWN	18.14	23.49	27.6	18.0	23.487
4	UNKNOWN	29.61	27.33	21.9	20.9	27.327
Total			100.00	140.2	76.5	100.000

18 (97%ee)



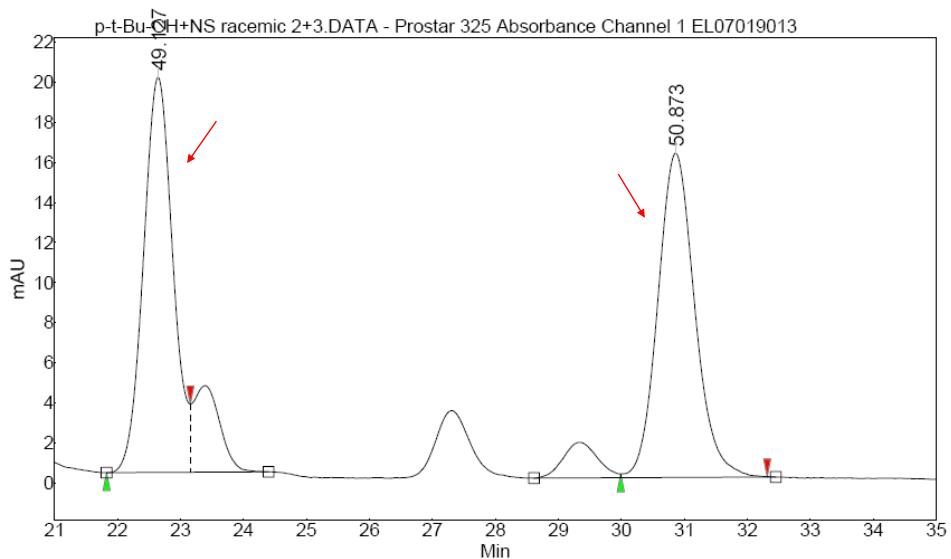
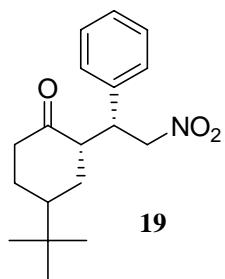
18



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	15.84	1.50	2.0	0.8	1.501
2	UNKNOWN	27.94	98.50	49.6	54.3	98.499
Total			100.00	51.6	55.1	100.000

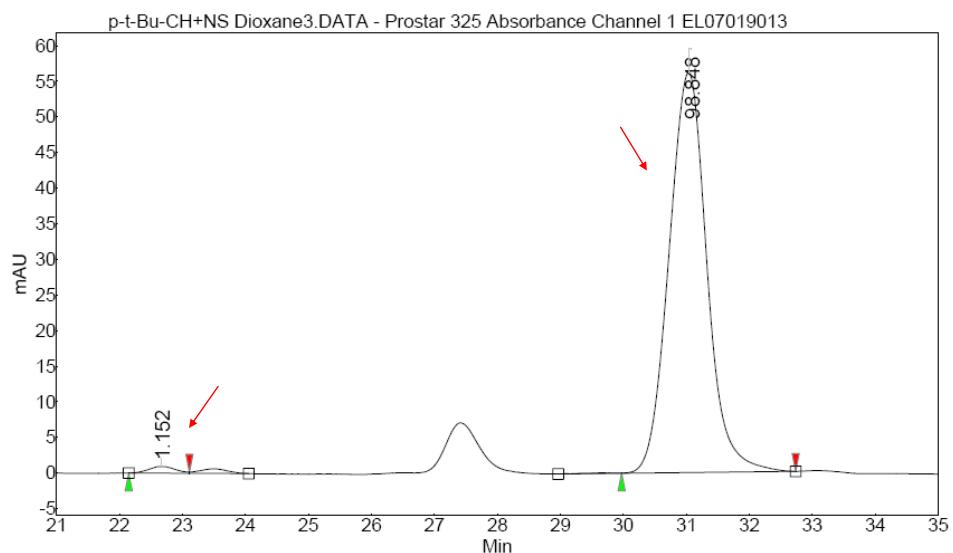
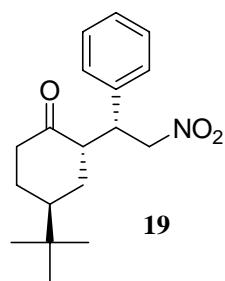
19 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	22.64	49.13	19.7	10.6	49.127
2	UNKNOWN	30.86	50.87	16.2	11.0	50.873
Total			100.00	35.9	21.6	100.000

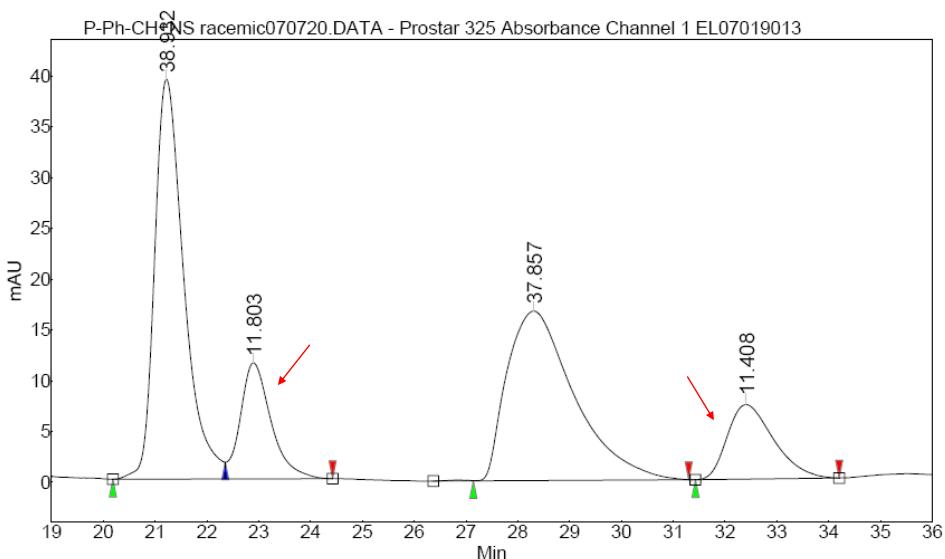
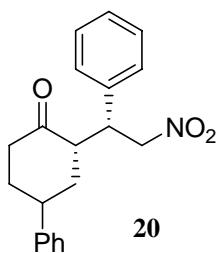
19 (98%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	22.67	1.15	0.9	0.5	1.152
2	UNKNOWN	31.04	98.85	56.2	39.1	98.848
Total			100.00	57.1	39.6	100.000

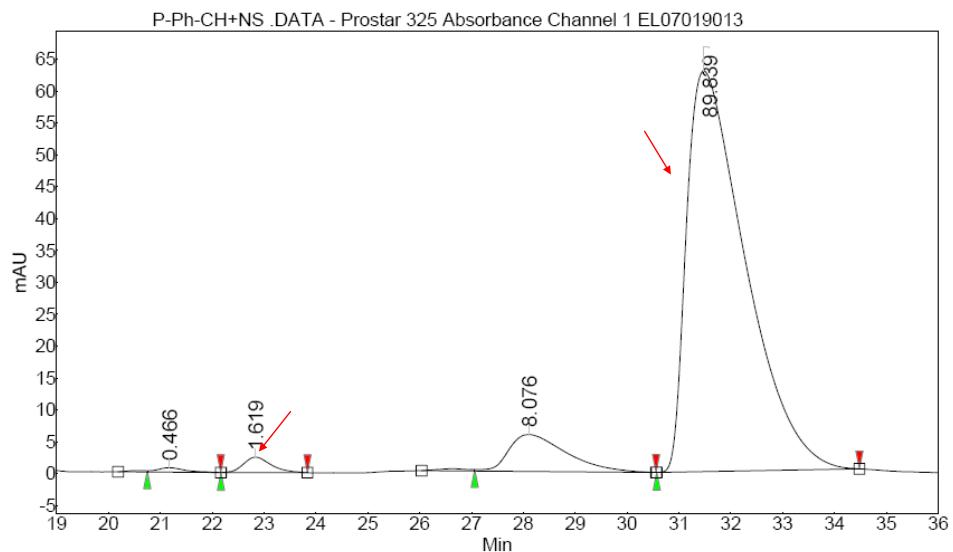
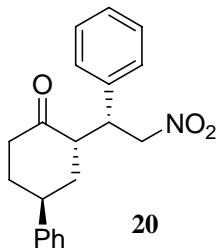
20 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	21.22	38.93	39.4	25.8	38.932
2	UNKNOWN	22.90	11.80	11.4	7.8	11.803
3	UNKNOWN	28.31	37.86	16.7	25.1	37.857
4	UNKNOWN	32.41	11.41	7.3	7.6	11.408
Total			100.00	74.8	66.3	100.000

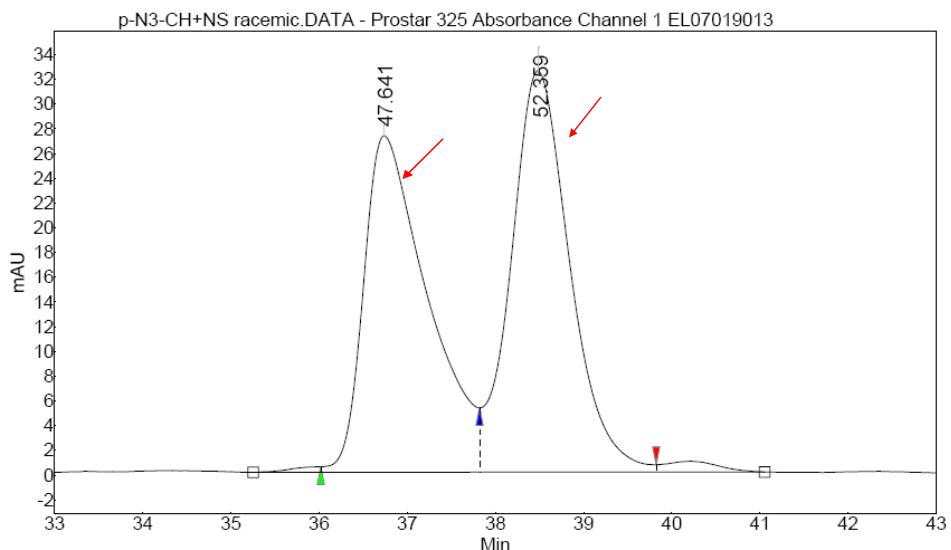
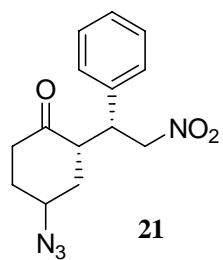
20 (96%ee)



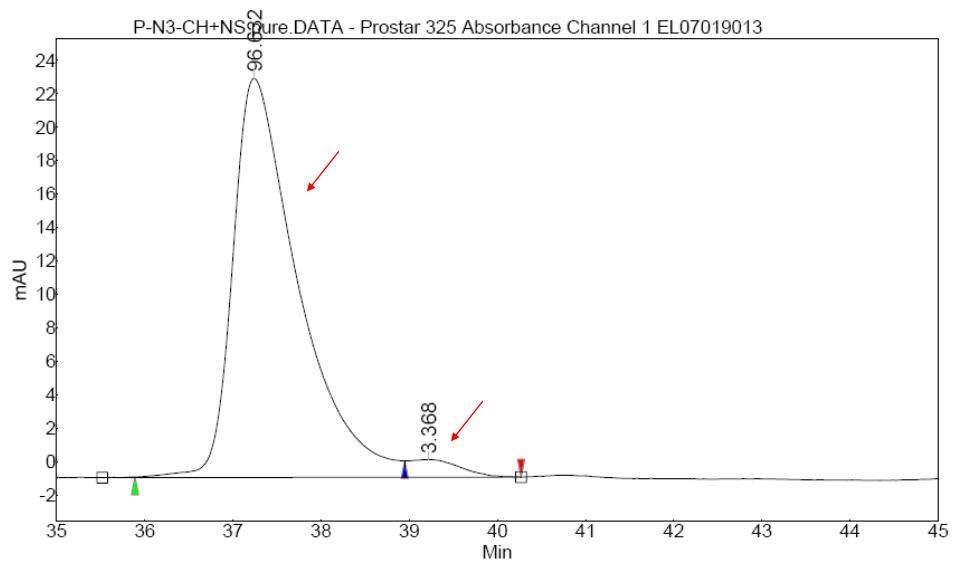
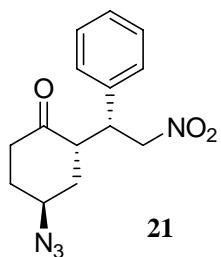
Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	21.17	0.47	0.7	0.4	0.466
2	UNKNOWN	22.83	1.62	2.4	1.5	1.619
3	UNKNOWN	28.10	8.08	5.8	7.4	8.076
4	UNKNOWN	31.48	89.84	62.8	82.3	89.839
Total			100.00	71.7	91.6	100.000

21 (racemic)



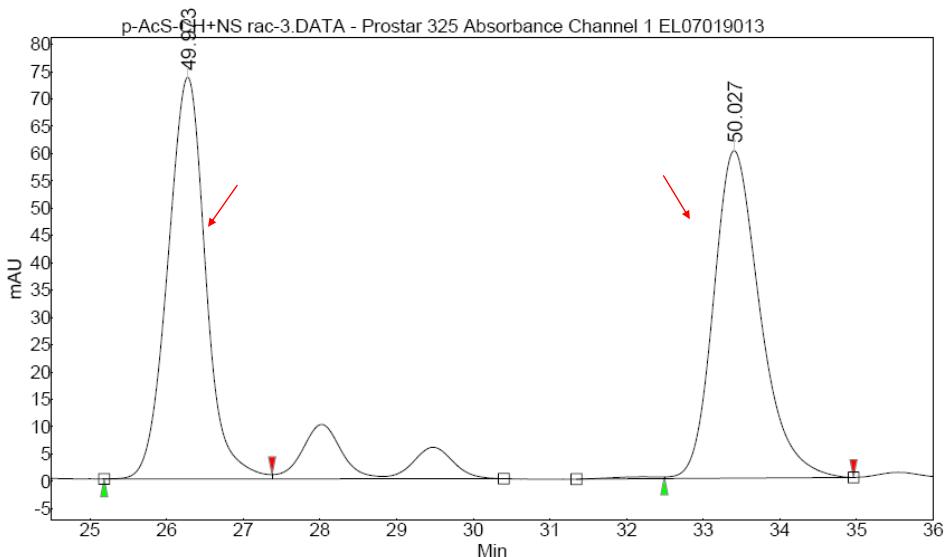
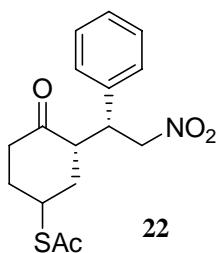
21 (93%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	37.24	96.63	23.9	20.5	96.632
2	UNKNOWN	39.21	3.37	1.1	0.7	3.368
Total			100.00	24.9	21.2	100.000

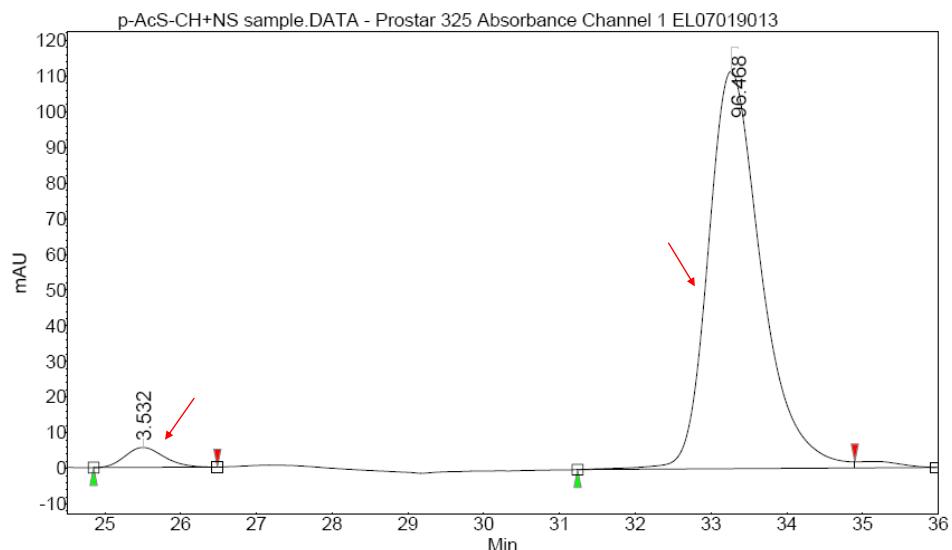
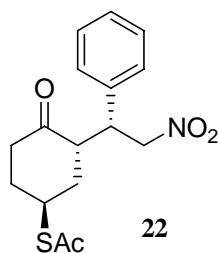
22 (racemic)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	26.28	49.97	73.5	42.0	49.973
2	UNKNOWN	33.40	50.03	60.0	42.1	50.027
Total			100.00	133.5	84.1	100.000

22 (93%ee)



Peak results :

Index	Name	Time [Min]	Quantity [% Area]	Height [mAU]	Area [mAU.Min]	Area % [%]
1	UNKNOWN	25.50	3.53	5.6	3.3	3.532
2	UNKNOWN	33.27	96.47	111.4	90.6	96.468
Total			100.00	117.0	93.9	100.000