Supporting Information

Chiral Ureas and Thioureas Supported on Polystyrene for Enantioselective Aza-Henry Reaction in Solvent-free conditions.

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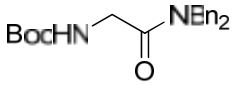
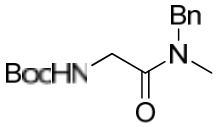
1. Synthesis of Catalysts and imines.

2-(*tert*-Butoxycarbonylamino)-*N,N*-dibenzylacetamide (1).



To a cold solution (-15 ºC) of Boc-glycine (7.0 g, 40 mmol) and 4-methylmorpholine (4.4 mL, 40 mmol) in dry THF (125 mL), ethyl chloroformate (3.8 mL, 40 mmol) in THF (20 mL) was added dropwise in 15 min. After stirring for another 30 min, dibenzylamine (7.8 mL, 40 mmol) was added. Then the reaction mixture was allowed to warm to room temperature and stirred overnight. After evaporation of the solvent *in vacuo*, the residue was diluted with EtOAc (150 mL) and the organic phase was washed with 10% Na_2CO_3 (50 mL), 0.1M HCl (2 x 50 mL), brine and dried over anhydrous $MgSO_4$. After filtration and evaporation of solvent *in vacuo*, the crude solid was recrystallized from hexane-ethyl acetate to provide N-Boc-α-amino amide **1** (11.3 g, 32 mmol, 80%) as a colorless solid. Mp 84-85 ºC. **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 1.44 (s, 9H, $\underline{CH_3}$); 4.07 (d, J = 4.2 Hz, 2H, $\underline{CH_2}$NH); 4.37 (s, 2H, C$\underline{H_2}$Ph); 4.61 (s, 2H, C$\underline{H_2}$Ph); 5.60 (br s, 1H, $\underline{NH}$); 7.10-7.40 (m, 10H, $\underline{Ha}$r). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 28.3 ($\underline{C}H_3$); 42.4 ($\underline{C}H_2$NH); 48.5, 48.9 ($\underline{C}H_2$Ph); 79.6 ($\underline{C}(CH_3)_3$); 126.4, 127.6, 127.9, 128.3, 128.7, 129.1 ($\underline{CH}$ar); 135.3, 136.5 ($\underline{Ca}$r); 155.7 ($\underline{C}O_2$tBu), 169.0 ($\underline{CO}$N). **IR** (ATR): 3411, 2986, 1702, 1649, 1506, 1448, 1161, 949, 752, 705 cm^{-1}. **HRMS** calcd. for $C_{21}H_{26}N_2O_3$ + Na: 377.1835; found: 377.1823.

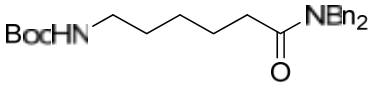
2-(*tert*-Butoxycarbonylamino)-N-benzyl-N-methylacetamide (2).[1]



This compound was obtained from Boc–glycine (7g, 40 mmol) and N-benzylmethylamine (5.5 mL, 40 mmol) as described for **1** and used for the subsequent step without further purification: 9.9 g (35.6 mmol, 89% yield). Colorless solid, mp 58-59 ºC (n-Hexane). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 1.42 (s, 3.6H, C($\underline{CH_3}$)); 1.44 (s, 5.4H, C($\underline{CH_3}$)); 2.85 (s, 1.8H, $\underline{CH_3}$N); 2.86 (s, 1.2H, $\underline{CH_3}$N); 3.99 (d, J = 4.3 Hz, 1.2H, $\underline{CH_2}$NHBoc); 4.01 (d, J = 4.2 Hz, 0.8H, C$\underline{H_2}$NHBoc); 4.44 (s, 0.8H, $\underline{CH_2}$Ph); 4.58 (s, 1.2H, $\underline{CH_2}$Ph); 5.55 (br s, 0.4H, N$\underline{H}$); 5.58 (br s, 0.6H, N$\underline{H}$); 7.10-7.35 (m, 5H, $\underline{Ha}$r). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 28.3 (C($\underline{C}H_3$)); 33.4, 34.0 ($\underline{C}H_3$N); 42.2, 42.4 ($\underline{C}H_2$N);

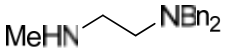
51.1, 52.1 ($\underline{C}H_2Ph$); 79.5 ($\underline{C}(CH_3)_3$); 126.3, 127.5, 127.9, 128.6, 129.0 ($\underline{C}$Har); 135.5, 136.5 ($\underline{C}$ar); 155.6, 155.7 ($\underline{C}O_2tBu$); 168.4, 168.6 ($\underline{CO}$N). **IR** (ATR): 3339, 2972, 2925, 1695, 1649, 1478, 1452, 1365, 1147, 1049, 1018, 868, 745, 698 cm^{-1}. **HRMS** calcd. for $C_{15}H_{22}N_2O_3$ + Na: 301.1523; found: 301.1521.

6-(*tert*-Butoxycarbonylamino)-*N*,*N*-dibenzylhexanamide (3).



This compound was obtained from Boc-6-aminohexanoic acid (6.0 g, 26 mmol) by reaction with dibenzylamine (5 mL, 26 mmol) as described for **1** and purified by flash column chromatography on silica gel (eluent, hexane/EtOAc: 4/1 to 2/1). Yield: 8.0 g (19.5 mmol, 75%). Colorless oil. **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 1.34 (m, 2H, $\underline{CH_2}$); 1.42 (s, 9H, $(C\underline{H_3})_3C$); 1.47 (m, 2H, $C\underline{H_2}$); 1.71 (m, 2H, $C\underline{H_2}$); 2.40 (t, 2H, J = 7.4 Hz, $\underline{CH_2}CON$); 3.08 (d, 2H, J = 6.3 Hz, $C\underline{H_2}NH$); 4.43 (s, 2H, $\underline{CH_2}Ph$); 4.59 (s, 2H $C\underline{H_2}Ph$); 4.63 (br s, 1H $\underline{NH}$); 7.10-7.40 (m, 10H, $\underline{H}$ar). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 24.8 ($\underline{C}H_2$); 26.4 ($\underline{C}H_2$); 28.3 ($C\underline{C}H_3)_3$); 29.8 ($\underline{C}H_2$); 32.9 ($\underline{C}H_2CON$); 40.3 ($\underline{C}H_2NH$); 49.8, 48.1 ($\underline{C}H_2Ph$); 78.8 ($\underline{C}CH_3)_3$); 126.2, 127.2, 127.5, 128.2, 128.5, 128.8 ($\underline{C}$Har); 136.5, 137.4 ($\underline{C}$ar); 155.9 ($\underline{C}O_2{}^tBu$); 173.3 ($\underline{CO}$N). **IR** (ATR): 3344, 2977, 2930, 1700, 1638, 1364, 1246, 1168, 729, 698 cm^{-1}. **HRMS** calcd. for $C_{25}H_{34}N_2O_3$ + H: 411.2642; found: 411.2644.

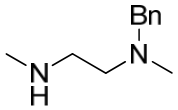
N^1,N^1-Dibenzyl-N^2-methylethane-1,2-diamine (4).[2]



A solution of amide **1** (10.4 g, 29.5 mmol) in anhydrous THF (90 mL) was added dropwise to a suspension of $LiAlH_4$ (3.5 g, 89 mmol, 3 equiv) in 120 mL of the same solvent, and refluxed under nitrogen atmosphere for 12 h. The suspension was cooled to 0 ºC and sequentially treated with H_2O (3.5 mL), 15% NaOH solution (3.5 mL) and H_2O (10.5 mL), and stirred for 2h. The white solids were removed by filtration, the solvent of the filtrate was evaporated on the rotavapor and the residue was purified by flash column chromatography on silica gel (CH_2Cl_2/MeOH: 4/1). Yield: 7.1 g (28.0 mmol, 95%). Colorless oil. **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 1.50 (br s, 1H, $\underline{NH}$); 2.26 (s, 3H, $\underline{CH_3}$); 2.62 (m, 4H, $C\underline{H_2}$); 3.59 (s, 4H, $C\underline{H_2}Ph$); 7.20-7.40 (m, 10H, $\underline{H}$ar). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 36.2 ($\underline{C}H_3$); 49.4 ($\underline{C}H_2NH$); 53.1 ($\underline{CH_2}$); 58.7 ($\underline{C}H_2Ph$); 126.9,

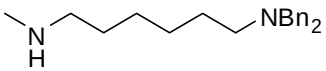
128.2, 128.8 (CHar); 139.5 (Car). **IR** (ATR)**:** 3305, 3022, 2784, 1500, 1448, 1370, 735, 695 cm^{-1}**. HRMS** calcd. for $C_{17}H_{22}N_2$ + H: 225.1856; found: 255.1858.

N^1-Benzyl-N^1,N^2-dimethylethane-1,2-diamine (5).[3]



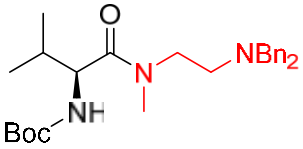
Obtained by reduction of **2** (9.6 g, 34.5 mmol) with LAH (4.14 g, 103.5 mmol) by the procedure described for the preparation of **4** and used for the subsequent step without further purification. Yield: 5.8 g (32.4 mmol, 94%). Colorless oil. **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 2.14 (s, 3H, CH_3); 2.36 (s, 3H, CH_3); 2.48 (t, 2H, J = 6.0 Hz, CH_2); 2.62 (t, 2H, J = 6.0 Hz , CH_2); 3.45 (s, 2H, CH_2Ph); 7.19-7.26 (m, 5H, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 34.3, 42.0 (CH_3); 47.6, 54.1 (CH_2N); 62.5 (CH_2Ph); 127.1, 128.2, 129.0 (CHar); 138.4 (Car). **IR** (ATR): 3380, 2946, 2780, 1664, 1452, 1364, 1127, 1029, 739, 693 cm^{-1}. **HRMS** calcd. for $C_{11}H_{18}N_2$ + Na: 201.1362; found: 201.1363.

N^1, N^1-Dibenzyl-N^6-methylhexane-1,6-diamine (6).



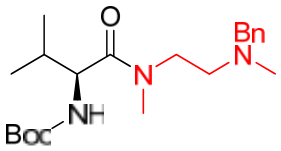
This compound was obtained from N–Boc–amide **3** (8.0 g, 19.5 mmol) by reduction with LAH in THF at reflux for 5h as described for **4** and purified by flash chromatography (EtOAc/MeOH: 4/1): 4.8 g (15.4 mmol, 79% yield). Colorless oil. **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 1.17 (br s, 1H, NH); 1.28 (m, 4H, CH_2); 1.45 (m, 2H, CH_2); 1.54 (m, 2H, CH_2); 2.43 (m, 2H of CH_2NBn_2 and 3H of CH_3); 2.53 (m, 2H, CH_2NH); 3.57 (s, 4H CH_2Ph); 7.20-7.40 (m, 10H, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 26.9 (CH_2); 27.1 (CH_2); 29.8 (CH_2); 36.5 (CH_3); 52.1 (CH_2N); 53.2 (CH_2N); 58.3 (CH_2Ph); 126.6, 128.0, 128.7 (CHar); 140.0 (Car). **IR** (ATR): 3028, 2930, 2853, 2791, 1494, 1452, 1365, 1065, 734, 698 cm^{-1}. **HRMS** calcd. for $C_{21}H_{30}N_2$ + H: 311.2482; found: 311.2479.

(S)-Boc-N-(2-(dibenzylamino)ethyl)-N-methylvalinamide (7).



Boc-L-valine (3.30 g, 15.2 mmol, 1.2 equiv) and *N,N'*-dicyclohexylcarbodiimide (DCC) (3.14 g, 15.2 mmol, 1.2 equiv) were dissolved in dichloromethane (40 mL) and cooled down to 0 ºC. After the solution was stirred for 30 min, a solution of diamine **4** (3.25 g, 12.7 mmol) in dichloromethane (40 mL) was added dropwise over 15 min. After the addition was complete, the mixture was warmed to room temperature and stirred for another 10 h. After filtration and removal of solvent at reduced pressure, the residue was purified through flash column chromatography on silica gel (eluent, hexane/ethyl acetate: 4/1) to provide 4.67 g of amide **7** (10.3 mmol, 81%) as a colorless oil. $[\alpha]_D^{23}$ = -12.7 (c = 1.1, MeOH). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 0.75 (d, J = 6.8 Hz, 0.9H, $\underline{CH_3}$); 0.78 (d**,** J = 6.8 Hz, 0.9H, $\underline{CH_3}$); 0.83 (d, J = 6.8 Hz, 2.1H, $C\underline{H_3}$); 0.92 (d, J = 6.8 Hz, 2.1H, $\underline{CH_3}$); 1.40 (s, 2.7H, $C(\underline{CH_3})_3$); 1.42 (s, 6.3H, $C(\underline{CH_3})_3$); 1.85 (m, 1H, $\underline{CH}(CH_3)_2$); 2.56 (m, 2H, $C\underline{H_2}N$); 2.75 (s, 0.9H, $C\underline{H_3}N$); 2.84 (s, 2.1H, $C\underline{H_3}N$); 3.49 (m, 3H, C$\underline{HH}$N and C$\underline{HH}$Ph); 3.63 (m, 3H, CH$\underline{H}$N and C$\underline{HH}$Ph); 4.27 (dd, J = 9.2 Hz, J = 6.4 Hz, 0.3H, $\underline{CH}$N); 4.39 (dd, J = 9.2 Hz, J = 5.5 Hz, 0.7H, $\underline{CH}$N); 5.15 (d. J = 8.9 Hz, 0.3H, N$\underline{H}$); 5.30 (d, J = 9.0 Hz, 0.7H, $\underline{NH}$); 7.20-7.38 (m, 10H, $\underline{H}$ar). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 14.2, 17.1, 19.6, 21.0 ($\underline{C}H_3$); 28.3 ($C(\underline{C}H_3)_3$); 31.3, 31.7 ($\underline{C}H(CH_3)_2$); 34.0, 35.4 ($\underline{C}H_3N$); 45.5; 48.3; 50.7; 52.1 ($\underline{C}H_2$); 54.9 ($\underline{C}HN$); 58.5 ($\underline{C}H_2Ph$); 79.2 ($\underline{C}(CH_3)_3$); 126.9, 127.1, 128.2, 128.3, 128.8, 128.9 ($\underline{C}$Har); 139, 139.3 ($\underline{C}$ar); 155.6, 155.9 ($\underline{C}O_2tBu$); 171.1, 171.9 ($\underline{C}$ON). **IR** (ATR): 3426, 3292, 2971, 1716, 1638, 1493, 1369, 1251, 1168, 750, 698 cm^{-1}. **HRMS** calcd. for $C_{27}H_{39}N_3O_3$ + H: 454.3064; found: 454.3059.

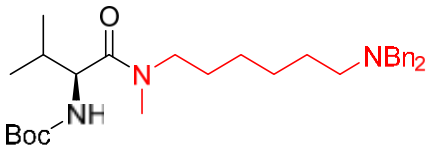
(S)-Boc-N-(2-(benzyl(methyl)amino)ethyl)-N-methylvalinamide (8).



Obtained by reaction of **5** (5.35 g, 30 mmol) with Boc-L-valine in the presence of DCC by the procedure described for the preparation of **7** and purified by flash column chromatography on silica gel (hexane/EtOAc: 2/1). Yield: 8.50 g (22.5 mmol, 75%). Colorless oil. $[\alpha]_D^{23}$ = +4.0 (c = 1.1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 0.88 (d, J = 6.8 Hz, 2.1H, $C\underline{H_3}$); 0.89 (d**,** J = 6.8 Hz, 0.9H, $\underline{CH_3}$); 0.90 (d, J = 6.8 Hz, 0.9H, $\underline{CH_3}$); 0.96 (d, J = 6.8 Hz, 2.1H, $C\underline{H_3}$); 1.42 (s, 2.7H, $C(\underline{CH_3})_3$); 1.43 (s, 6.3H, $C(\underline{CH_3})_3$); 1.93 (m, 1H, $\underline{CH}(CH_3)_2$); 2.23 (s, 2.1H, $C\underline{H_3}N$); 2.29 (s, 0.9H, $\underline{CH_3}N$); 2.56 (m, 2H, $\underline{CH_2}N$); 2.87 (s, 0.9H, $C\underline{H_3}NCO$); 3.05 (s, 2.1H, $C\underline{H_3}NCO$); 3.33 (dt, J = 13.5 Hz, J = 6.3 Hz,

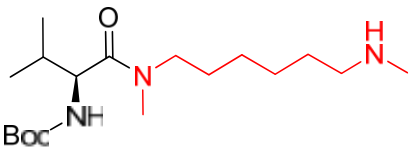
1H, CHHN); 3.51 (s, 1.4H, CH_2Ph); 3.53 (s, 0.6H, CH_2Ph); 3.73 (dt, J = 13.5 Hz, J = 6.7 Hz, 1H, CHHN); 4.41 (dd, J = 9.2 Hz, J = 7.4 Hz, 0.3H, CHN); 4.44 (dd, J = 9.2 Hz, J = 5.7 Hz, 0.7H, CHN); 5.23 (d, J = 9.3 Hz, 0.3H, NH); 5.29 (d. J = 8.7 Hz, 0.7H, NH); 7.22-7.32 (m, 5H, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 17.1, 17.3 (CH_3); 19.5, 19.6 (CH_3); 28.2 ($C(CH_3)_3$); 31.2, 31.8 ($CH(CH_3)_2$); 33.9, 35.8 (CH_3N); 42.1, 42.6 (CH_3NCO); 45.6; 47.9 (CH_2); 54.3, 55.2 (CH_2); 54.8, 54.9 (CHN); 62.4, 62.7 (CH_2Ph); 79.1, 79.2 ($C(CH_3)_3$); 126.9, 127.0 128.1, 128.2, 128.8 (CHar); 138.5, 138.6 (Car); 155.5, 155.8 (CO_2tBu); 171.8, 172.2 (CON). **IR** (ATR): 3426, 3297, 2966, 2796, 1706, 1633, 1489, 1365, 1240, 1168, 1018, 734, 698 cm^{-1}. **HRMS** calcd. for $C_{21}H_{35}N_3O_3$ + H: 378.2751; found: 378.2741.

(S)-Boc-N-(6-(dibenzylamino)hexyl)-N-methylvalinamide (9).



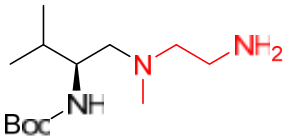
Obtained by reaction of **6** (2.03 g, 6.5 mmol) with Boc-L-valine in the presence of DCC by the procedure described for the preparation of **7** and purified by flash column chromatography on silica gel (hexane/EtOAc: 4/1). Yield: 2.47 g (4.85 mmol, 74%). Colorless oil. $[\alpha]_D^{23}$ = +10.4 (c = 1.1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.88 (d, J = 6.8 Hz, 1.8H, CH_3); 0.89 (d, J = 6.8 Hz, 1.2H, CH_3); 0.92 (d, J = 6.8 Hz, 1.2H, CH_3); 0.95 (d, J = 6.8 Hz, 1.8H, CH_3); 1.17 (m, 2H, CH_2); 1.26 (m, 2H, CH_2); 1.41 (s, 3.6H, $C(CH_3)_3$); 1.42 (s, 5.4H, $C(CH_3)_3$); 1.48 (m, 4H, CH_2); 1.91 (m, 1H, $(CH_3)_2CH$); 2.38 (m, 2H, CH_2NBn_2); 2.89 (s, 1.2H, CH_3N); 3.02 (s, 1.8H, CH_3N); 3.17 (m, 1H, CHHNMe); 3.47 (m, 1H, CHHNMe); 3.53 (s, 4H, CH_2Ph); 4.41 (m, 1H, CHN); 5.25 (d, J = 9.4 Hz, 0.4H, NH); 5.29 (d, J = 9.4 Hz, 0.6H, NH); 7.19-7.36 (m, 10H, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 17.1, 17.3 (CH_3); 19.5; 19.6 (CH_3); 26.6 (CH_2); 26.8 (CH_2); 26.9 (CH_2); 27.0 (CH_2); 28.3 $(CH_3)_3C$); 31.3, 31.9 ($CH(CH_3)_2$); 33.4, 33.5 (CH_3N); 47.9, 49.9 (CH_2); 53.1 (CH_2); 54.8, 55.0 (CHN); 58.2 (CH_2Ph); 79.2 ($(CH_3)_3C$); 126.6, 128.0, 128.7 (CHar); 139.9 (Car); 155.6, 155.9 (CO_2^{t}Bu); 127.7, 172.0 (CON). **IR** (ATR): 3421, 3302, 2935, 1711, 1638, 1494, 1452, 1365, 1168, 734, 698 cm^{-1}. **HRMS** calcd. for $C_{31}H_{47}N_3O_3$ + H: 510.3690; found: 510.3683.

(S)-Boc-N-methyl-N-(6-methylamino)hexyl)valinamide (10).



To a solution of Boc-L-valine (1.74g, 8.0 mmol) and 4-methylmorpholine (0.88 mL, 8.0 mmol) in anhydrous dichloromethane (80 mL) was dropped ethyl chloroformate (0.84 mL, 4.4 mmol) at -5 ºC. After 20 minutes of stirring, the reaction mixture was washed successively with a cold solution of citric acid (5% aqueous, 40 mL), a solution of sodium bicarbonate (10%, 40 mL) and water (40 mL). The organic layer was dried over $MgSO_4$, filtered and diluted with dichloromethane to a volume of 150 mL. This solution was added dropwise (30-60 minutes) to a vigorously stirred solution of *N,N'*-dimethyl-1,6-hexanediamine (7.2 mL, 40 mmol, 5 equiv) in dicloromethane (150 mL) previously cooled to -78 ºC. When the addition was complete, the mixture was stirred for 10 minutes at that temperature and then warmed to room temperature and stirred overnight. The reaction mixture was concentrated in vacuo to a volume of about 100 mL, and washed with water (6 ×40 mL). The organic phase was dried over $MgSO_4$, filtered, and the solvent was evaporated in vacuo. The crude product was purified by silica gel column chromatography (eluent dichloromethane/methanol: 3/2). The pure compound was obtained as a colorless oil (2.37 g, 6.9 mmol, 86% yield). $[\alpha]_D^{23}$ = +11.1 (c = 1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.88 (d, J = 6.4 Hz, 1.8H, C$\underline{H}_3$); 0.89 (d, J = 6.4 Hz, 1.2H, $\underline{CH}_3$); 0.93 (d, J = 6.8 Hz, 1.2H, C$\underline{H}_3$); 0.95 (d, J = 6.8 Hz, 1.8H, C$\underline{H}_3$); 1.32 (m, 4H, C$\underline{H}_2$); 1.41 (s, 9H, ($\underline{CH}_3$)$_3$C); 1.48 (m, 4H, C$\underline{H}_2$); 1.79 (br s, 1H, $\underline{NH}$); 1.92 (m, 1H, (CH$_3$)$_2\underline{CH}$); 3.23 (m 2.41 (s, 3H, C$\underline{H}_3$N); 2.55 (m, 2H, $\underline{CH}_2$NH); 2.91 (s, 1.2H, $\underline{CH}_3$NCO); 3.05 ((s, 1.8H, C$\underline{H}_3$NCO); 3.23 (m, 1H, C$\underline{HH}$NMe); 3.48 (m, 1H, C$\underline{HH}$NMe); 4.41 (m, 1H, $\underline{CH}$N); 5.27 (d, J = 9.5 Hz, 0.4H, NHBoc); 5.31 (d, J = 9.2 Hz, 0.6H, NHBoc). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 17.1 and 17.3 ($\underline{C}H_3$); 19.4 and 19.5 ($\underline{C}H_3$); 26.5 ($\underline{C}H_2$); 26.9 ($\underline{C}H_2$); 28.2 (($\underline{C}H_3$)$_3$C); 28.4 ($\underline{C}H_2$); 29.4 ($\underline{C}H_2$); 31.2 and 31.8 ((CH$_3$)$_2\underline{C}$H); 33.3 ($\underline{C}H_3$N); 35.2 and 36.3 ($\underline{C}H_3$N); 47.7 and 49.7 ($\underline{C}H_2$N); 51.8 ($\underline{C}H_2$NH); 54.7 and 54.9 ($\underline{C}$HN); 78.9 (CH$_3$)$_3\underline{C}$); 155.5 and 155.8 ($\underline{C}O_2{}^t$Bu); 171.7 and 171.9 ($\underline{C}$ON). **IR** (ATR): 3434, 3325, 2972, 2936, 1701, 1638, 1488, 1363, 1166, 917, 642 cm^{-1}. **HRMS** calcd. for $C_{18}H_{37}N_3O_3$ + H: 344.2907; found: 344.2908.

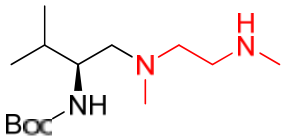
(S)-*tert*-Butyl (1-((2-aminoethyl)(methyl)amino)-3-methylbutan-2-yl)carbamate (11).



A solution of amino amide **7** (3.63 g, 8.0 mmol) in anhydrous THF (20 mL) was added dropwise to a suspension of $LiAlH_4$ (0.30 g, 16 mmol, 2 equiv) in 30 mL of the same solvent at 0 ºC, and the mixture was stirred at under nitrogen atmosphere for 1 h. Then, the suspension was sequentially treated at 0 ºC with water (0.3 mL), 15% NaOH solution (0.3 mL) and water (0.9 mL), and stirred for 2h. The white solids were removed by filtration, the solvent of the filtrate was evaporated on the rotavapor and the residue was purified by flash column chromatography on silica gel (hexane/EtOAc: 4/1) to yield (S)-Boc-N^1-(2-(dibenzylamino)ethyl)-N^1,3-dimethylbutane-1,2-diamine as a colorless oil: 2.63 g (6.0 mmol, 75 %). $[\alpha]_D^{23}$ = + 1.5 (c = 0.9, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 0.79 (d, 3H, J = 6.9 Hz, CH_3); 0.86 (d, 3H, J = 6.9 Hz, CH_3); 1.43 (s, 9H, $C(CH_3)_3$); 1.89 (m, 1H, $CH(CH_3)_2$); 2.13 (s, 3H, CH_3N); 2.22 (m, 2H, CH_2N); 2.54 (m, 4H, CH_2N); 3.52 (m, 1H, CHN); 3.60 (s, 4H, CH_2Ph); 4.56 (brs, 1H, NH); 7.20-7.40 (m, 10H, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 14.2, 17.2, (CH_3); 18.8, 21.0 (CH_3); 28.4 ($CCH_3)_3$); 29.7 ($CH(CH_3)_2$); 42.6 (CH_3N); 51.2, 56.0 (CH_2N); 58.7 (CH_2Ph); 60.3 (CHN); 78.8 ($C(CH_3)_3$); 126.8, 128.1, 128.8 (CHar); 139.7 (Car); 156.1 (CO_2tBu). **IR** (ATR): 3370, 2978, 2790, 1710, 1493, 1457, 1364, 1245, 1168, 740, 693 cm^{-1}. **HRMS** calcd. for $C_{27}H_{41}N_3O_2$ + H: 440.3271; found: 440.3255.

To a solution of this compound (2.12 g, 4.8 mmol) in MeOH (50 mL), was added $Pd(OH)_2$-C (0.7 g) in one portion. The mixture was stirred under H_2 for 24 h and the catalyst was removed by filtration and washed with methanol. The solvent was evaporated under reduced pressure and the residue was purified by flash column chromatography on silica gel (EtOAc/MeOH, 4:1) to give **11** (1.2 g, 4.6 mmol, 96%) as a colorless oil. $[\alpha]_D^{23}$ = +14.6 (c = 1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$, 330K): δ 0.92 (d, 3H, J = 6.8 Hz, CH_3); 0.94 (d, 3H, J = 6.8 Hz, CH_3); 1.46 (s, 9H, $C(CH_3)$); 1.77 (m, 1H, $CHCH_3$); 2.43 (s, 3H, CH_3N); 2.58 (m, 1H); 2.74 (m, 1H); 2.94 (m, 1H, CHHN); 3.02 (m, 1H, CHHN); 3.24 (m, 2H, CH_2NH_2); 3.55 (m, 1H, CHN); 6.77 (br s, 3H, NH and NH_2). **^{13}C-NMR** (101 MHz, $CDCl_3$, 330K): δ 17.9 (CH_3); 19.3 (CH_3); 28.4 ($C(CH_3)_3$); 31.0 ($CH(CH_3)_2$); 37.0 (CH_2NH_2); 41.7 (CH_3N); 54.1 (CHN); 55.0 (CH_2); 59.3 (CH_2); 79.4 ($C(CH_3)_3$); 156.8 (CO_2tBu). **IR:** 3250, 2961, 1685, 1524, 1462, 1395, 1240, 1168, 1013 cm^{-1}. **HRMS** calcd. for $C_{13}H_{29}N_3O_2$ + H: 260.2332; found: 260.2336.

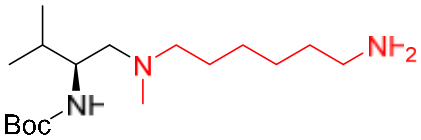
(S)-*tert*-Butyl 3-methyl-1-(methyl(2-(methylamino)ethyl)amino)butan-2-yl carbamate (12).



Boc–amide **8** (6.2 g, 16.4 mmol) was reduced by reaction with LAH (1.24 g, 32.8 mmol) in THF at 0 ºC for 1h as described for **11** and purified by flash chromatography (EtOAc) to yield (S)-Boc-N^1-(2-(benzyl(methyl)amino)ethyl)-N^1,3-dimethylbutane-1,2-diamine as a colorless oil: 4.1 g (11.2 mmol, 68% yield). $[\alpha]_D^{23}$ = + 8.7 (c = 1.3, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 0.84 (d, 3H, J = 6.9 Hz, C$\underline{H_3}$); 0.88 (d, 3H, J = 6.9 Hz, $\underline{CH_3}$); 1.42 (s, 9H, C($\underline{CH_3}$)$_3$); 1.94 (m, 1H, $\underline{CH}(CH_3)_2$); 2.21 (s, 3H, C$\underline{H_3}$N); 2.22 (s, 3H, $\underline{CH_3}$N); 2.25 (dd, J = 12.8 Hz, J = 5.7 Hz, 1H, C$\underline{HH}$N); 2.31 (dd, J = 12.8 Hz, J = 9.0 Hz, 1H, C$\underline{HH}$N); 2.42 (m, 2H, $\underline{CH_2}$N); 2.50 (m, 1H, $\underline{CH}$HN); 2.59 (m, 1H, C$\underline{HH}$N); 3.48 (d, J = 13.0 Hz, 1H, C$\underline{HH}$Ph); 3.52 (m, 1H, $\underline{CH}$N); 3.53 (d, J = 13.0 Hz, 1H, C$\underline{HH}$Ph); 5.06 (br s, 1H, $\underline{NH}$); 7.22-7.32 (m, 5H, $\underline{H}$ar). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 17.5, 18.7, ($\underline{C}H_3$); 28.4 ($\underline{C}CH_3)_3$); 30.0 ($\underline{C}H(CH_3)_2$); 42.3, 42.9 ($\underline{C}H_3$N); 53.3 ($\underline{C}$HN); 54.8, 55.3 ($\underline{C}H_2$N); 62.5 ($\underline{C}H_2$N); 62.8 ($\underline{C}H_2$Ph); 78.6 ($\underline{C}(CH_3)_3$); 126.9, 128.1, 129.2 ($\underline{C}$Har); 138.7 ($\underline{C}$ar); 156.3 ($\underline{C}O_2$tBu). **IR** (ATR): 3328, 2956, 2790, 1685, 1452, 1364, 1245, 1168, 1049, 1023, 740, 703 cm^{-1}. **HRMS** calcd. for $C_{21}H_{37}N_3O_2$ + Na: 386.2778; found: 386.2780.

This compound (2.05 g, 5.65 mmol) was debenzylated by hydrogenation with 615 mg of Pd-C (10 wt. %) in MeOH (50 mL) by the procedure described for the preparation of **11** and purified by flash column chromatography on silica gel (EtOAc/MeOH, 4:1) to yield **12** (1.20 g, 4.4 mmol, 78%) as a colorless oil. $[\alpha]_D^{23}$ = +3.3 (c = 1.1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$): δ 0.84 (d, 3H, J = 6.9 Hz, $\underline{CH_3}$); 0.90 (d, 3H, J = 6.9 Hz, $\underline{CH_3}$); 1.43 (s, 9H, C($\underline{CH_3}$)); 1.87 (m, 1H, $\underline{CHC}H_3$); 2.21 (s, 3H, C$\underline{H_3}$N); 2.30 (m, 2H, $\underline{CH_2}$); 2.43 (s, 3H, C$\underline{H_3}$N); 2.49 (m, 2H, $\underline{CH_2}$); 2.61 (t, J = 5.7 Hz, 2H, C$\underline{H_2}$); 3.56 (m, 1H, $\underline{CH}$N); 4.57 (br s, 1H, $\underline{NH}$). **^{13}C-NMR** (101 MHz, $CDCl_3$): δ 17.0 ($\underline{C}H_3$); 19.1 ($\underline{C}H_3$); 28.3 (C($\underline{C}H_3)_3$); 29.8 ($\underline{C}H(CH_3)_2$); 36.3 ($\underline{C}H_3$N); 42.3 ($\underline{C}H_3$N); 49.2 ($\underline{C}H_2$NH); 53.3 ($\underline{C}$HN); 57.3 ($\underline{C}H_2$); 59.6 ($\underline{C}H_2$); 78.7 ($\underline{C}(CH_3)_3$); 156.2 ($\underline{C}O_2$tBu). **IR** (ATR): 3313, 2961, 2796, 1690, 1530, 1452, 1365, 1245, 1168, 734 cm^{-1}. **HRMS** calcd. for $C_{14}H_{31}N_3O_2$ + Na: 296.2308; found: 296.2307.

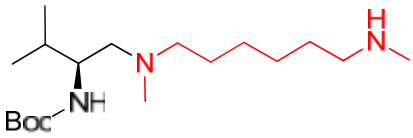
(S)-*tert*-Butyl (1-((6-aminohexyl)(methyl)amino)-3-methylbutan-2-yl)carbamate (13).



Boc–amide **9** (2.74 g, 4.85 mmol) was reduced by reaction with LAH (0.37 g, 9.7 mmol) in THF at 0 ºC for 1h as described for **11** and purified by flash chromatography (hexane/EtOAc: 3/1) to yield (S)-*tert*-Butyl (1-((6-(dibenzylamino)hexyl) (methyl)amino)-3-methylbutan-2-yl)carbamate as a colorless oil: 1.56 g (3.15 mmol, 65% yield). $[\alpha]_D^{23}$ = +2.2 (c = 1.1, MeOH). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.84 (d, J = 6.9 Hz, 3H, $\underline{CH_3}$); 0.90 (d, J = 6.9 Hz, 3H, $\underline{CH_3}$); 1.19 (m, 2H, $C\underline{H_2}$); 1.26 (m, 2H, $\underline{CH_2}$); 1.38 (m, 2H, $C\underline{H_2}$); 1.44 (s, 9H, $(\underline{CH_3})_3C$); 1.50 (m, 2H, $\underline{CH_2}$); 1.94 (m, 1H, $(CH_3)_2\underline{CH}$); 2.19 (s, 3H, $C\underline{H_3}N$); 2.28 (m, 4H, $\underline{CH_2}$); 2.39 (t, J = 7.2 Hz, 2H, $\underline{CH_2}NBn_2$); 3.54 (s, 4H, $C\underline{H_2}Ph$); 3.58 (m, 1H, $C\underline{H}N$); 4.58 (br s, 1H, $\underline{NH}$); 7.20-7.37 (m, 10H, $\underline{H}ar$). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 17.0 ($\underline{CH_3}$); 18.9 ($\underline{C}H_3$); 25.5 ($\underline{C}H_2$); 26.9 ($\underline{C}H_2$); 27.1 ($\underline{C}H_2$); 27.2 ($\underline{C}H_2$); 28.4 ($C(\underline{CH_3})_3$);), 29.7 ($(CH_3)_2\underline{C}H$); 42.3 ($\underline{C}H_3N$); 53.2 ($\underline{C}H_2N$); 57.8 ($\underline{C}H_2$); 58.2 ($\underline{C}H_2Ph$); 58.6 ($\underline{C}HN$); 67.8 ($\underline{C}H_2$); 78.7 ($\underline{C}(CH_3)_3$); 126.6, 128.0, 128.6 ($\underline{C}Har$); 139.9 ($\underline{C}ar$); 156.1 ($\underline{C}O_2tBu$). **IR** (ATR): 3426, 3364, 2935, 2796, 1700, 1494, 1365, 1240, 1168, 729, 698 cm^{-1}. **HRMS** calcd. for $C_{31}H_{49}N_3O_2$ + H: 496.3897; found: 496.3876.

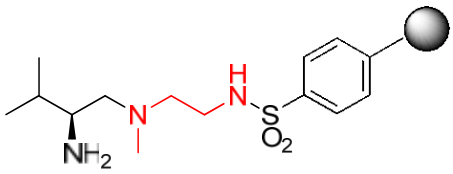
This compound (6.85 g, 13.8 mmol) was debenzylated by hydrogenation with 1.37 g of Pd-C (10 wt. %) in MeOH (130 mL) by the procedure described for the preparation of **11** and purified by flash column chromatography on silica gel (EtOAc/MeOH/NH_3: 4/1/0.1) to yield **13** (2.96 g, 9.4 mmol, 68%) as a colorless oil. $[\alpha]_D^{23}$ = +3.2 (c = 1.0, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$, 330K) δ 0.86 (d, J = 6.9 Hz, 3H, $C\underline{H_3}$); 0.91 (d, J = 6.9 Hz, 3H, $\underline{CH_3}$); 1.36 (m, 4H, $\underline{CH_2}$); 1.44 (s, 9H, $(C\underline{H_3})_3C$); 1.47 (m, 2H, $\underline{CH_2}$); 1.67 (m, 2H, $C\underline{H_2}$); 1.90 (m, 1H, $(CH_3)_2\underline{CH}$); 2.24 (s, 3H, $\underline{CH_3}N$); 2.39 (m, 4H, $\underline{CH_2}$); 2.89 (t, J = 7.3 Hz, 2H, $C\underline{H_2}NH_2$); 3.54 (m, 1H, $\underline{CH}N$); 4.75 (br s, 1H, $\underline{NH}$); 5.94 (br s, 2H, $\underline{NH_2}$). **^{13}C-NMR** (101 MHz, $CDCl_3$, 330K) δ 17.1 ($\underline{CH_3}$); 18.9 ($\underline{C}H_3$); 26.2 ($\underline{C}H_2$); 26.5 ($\underline{C}H_2$); 26.7 ($\underline{C}H_2$); 28.3 ($C(\underline{C}H_3)_3$); 28.8 ($\underline{C}H_2$); 30.1 ($\underline{CH}(CH_3)_2$); 40.1 ($\underline{C}H_2NH_2$); 42.0 ($\underline{C}H_3N$); 53.4 ($\underline{C}HN$); 57.5 ($\underline{C}H_2N$); 59.0 ($\underline{C}H_2N$); 78.6 ($\underline{C}(CH_3)_3$);156.1 ($\underline{C}O_2tBu$). **IR** (ATR): 3346, 2957, 2931, 1685, 1519, 1389, 1363, 1249, 1171 cm^{-1}. **HRMS** calcd. for $C_{17}H_{37}N_3O_2$ + H: 316.2958; found: 316.2960.

(S)-*tert*-Butyl (3-methyl-1-(methyl(6-(methylamino)hexyl)amino)butan-2-yl) carbamate (14).



This compound was obtained from Boc–amide **10** (2.37 g, 6.9 mmol) by reaction with LAH (0.52 g, 13.8 mmol) in THF at 0 ºC for 1h as described for **11** and purified by flash chromatography (CH_2Cl_2/MeOH: 3/2 to CH_2Cl_2/MeOH/NH_3: 3/2/0.1): 1.42 g (4.3 mmol, 62% yield). Colorless oil. $[\alpha]_D^{23}$ = +3.6 (c = 1, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.85 (d, J = 6.9 Hz, 3H, $\underline{CH_3}$); 0.91 (d, J = 6.9 Hz, 3H, C$\underline{H_3}$); 1.32 (m, 4H, $\underline{CH_2}$); 1.45 (s, 9H, $(\underline{CH_3})_3C$); 1.48 (m, 4H, $\underline{CH_2}$); 1.95 (m, 1H, $(CH_3)_2\underline{CH}$); 2.20 (s, 3H, $\underline{CH_3}N$); 2.29 (m, 3H, $\underline{CH_2}$ and $\underline{CH}HN$); 2.35 (m, 1H, C$\underline{H}HN$); 2.43 (s, 3H, C$\underline{H_3}N$); 2.57 (t, J = 7.2 Hz, 2H, C$\underline{H_2}$NH); 3.57 (m, 1H, C$\underline{H}$N); 4.55 (br s, 1H, N$\underline{H}$Boc). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 16.9 ($\underline{C}H_3$): 18.8 ($\underline{C}H_3$); 27.0 ($\underline{C}H_2$); 27.1 ($\underline{C}H_2$); 28.2 ($(\underline{C}H_3)_3C$); 29.6 ($\underline{C}H_2$); 29.7 ($(CH_3)_2\underline{C}H$); 36.2 ($\underline{C}H_3N$); 42.2 ($\underline{C}H_3N$); 51.8 ($\underline{C}H_2NH$); 58.6 ($\underline{C}HN$); 78.5 ($(CH_3)_3\underline{C}$); 156.0 ($\underline{C}O_2tBu$). **IR** (ATR): 3332, 2935, 2857, 2789, 1698, 1458, 1364, 1243, 1175, 862, 734 cm^{-1}. **HRMS** calcd. for $C_{18}H_{39}N_3O_3$ + H: 330.3115; found: 330.3116.

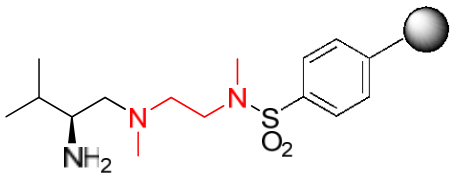
Preparation of Resin 15.



Chlorosulfonyl polystyrene (1.0 g, 1.9 mmol) was added to a solution of Boc-amine **11** (0.98 g, 3.8 mmol, 2 equiv) and Et_3N (0.27 mL, 1.9 mmol, 1 equiv) in anhydrous CH_2Cl_2 (60 mL) at room temperature. The resulting mixture was stirred for four days. The polymer was then filtered off and washed successively with methanol, water, methanol/water (1:1), and methanol. The material was dried under vacuum to give 1.41 g of polymer Boc-**15** (100% yield), which corresponds to approximately 90 % of ligand incorporation and an effective functionalization, *f* = 1.36 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C: 64.84, H: 7.32, N: 5.73, S: 4.82). **IR** (ATR): 3255, 2961, 2915, 1700, 1452, 1318, 1158, 692 cm-^{1}.

Resin Boc-**15** (1.40 g) was suspended in a 4:1 mixture of CH_2Cl_2/TFA (7.5 mL) and stirred at rt for 18 h. After this period, the resin was filtered and washed with MeOH/Et_3N 98:2 (100 mL), water (100 mL), and diethyl ether (100 mL). The yellow resin was dried under vacuum to give 1.08 g of polymer **15** (90% yield) which corresponds to approximately 93 % of ligand incorporation and an effective functionalization, f = 1.59 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C: 67.42, H: 7.31, N: 6.70, S: 5.73. **IR** (ATR): 3222, 2925, 1690, 1602, 1452, 1313, 1153, 693 cm^{-1}.

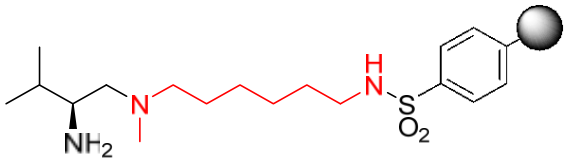
Preparation of Resin 16.



The same procedure for resin **15** was followed, using chlorosulfonyl polystyrene (790 mg, 1.5 mmol) and **12** (820 mg, 3.0 mmol) to give 1.17 g of polymer Boc-**16 (**100% yield), which corresponds to approximately 97 % of ligand incorporation and an effective functionalization, f = 1.42 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C, 66.70; H, 7.44; N, 5.97, S, 4.70). **IR** (ATR): 3380, 2966, 2930, 1695, 1509, 1447, 1339, 1158, 703 cm^{-1}.

Resin Boc-**16** (1.1 g) was treated with a 4:1 mixture of CH_2Cl_2/TFA (6 mL) as described for Boc-**15** to give 950 mg of polymer **16** (100% yield) which corresponds to approximately 96 % of ligand incorporation and an effective functionalization, f = 1.56 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C, 62.62; H, 6.99; N, 6.57, S, 5.20). **IR** (ATR): 2925, 1680, 1592, 1452, 1333, 1152, 703 cm^{-1}.

Preparation of Resin 17.

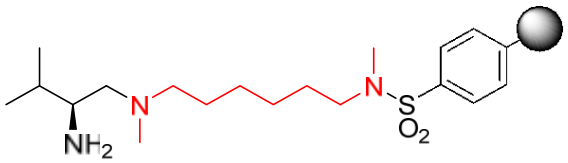


The same procedure for resin **15** was followed, using chlorosulfonyl polystyrene (1.8 g, 3.35 mmol) and **13** (2.1 g, 6.7 mmol) to give 2.88 g of polymer Boc-**17 (**100% yield), which corresponds to approximately 92 % of ligand incorporation and an effective functionalization, f = 1.32 mmol g^{-1}, calculated on the basis of elemental analysis

(Found: C: 68.57, H: 8.06, N: 5.54, S: 4.58. **IR** (ATR): 3273, 2926, 1685, 1493, 1452, 1322, 1151, 699, 579 cm-1.

Resin Boc-**17** (2.87 g) was treated with a 4:1 mixture of CH_2Cl_2/TFA (14 mL) as described for Boc-**15** to give 2.47 g of polymer **17** (99% yield) which corresponds to approximately 93 % of ligand incorporation and an effective functionalization, *f* = 1.51 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C: 70.47, H: 8.00, N: 6.32, S: 5.18. **IR** (ATR): 3273, 2926, 2853, 1597, 1451, 1322, 1156, 1094, 699, 579 cm^{-1}.

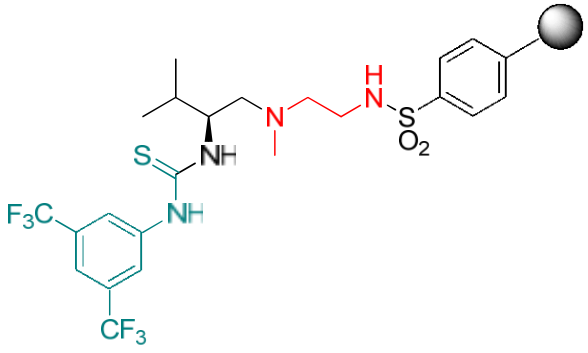
Preparation of Resin 18.



The same procedure for resin **15** was followed, using chlorosulfonyl polystyrene (953 mg, 1.81 mmol) and **14** (1.19 g, 3.62 mmol) to give 1.44 g of polymer Boc-**18 (**97% yield), which corresponds to approximately 95 % of ligand incorporation and an effective functionalization, *f* = 1.33 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C: 72.42, H: 8.36, N: 5.57, S: 4.48. IR (ATR): 3379, 2933, 1702, 1490, 1453, 1336, 1161, 1087, 699, 572 cm^{-1}.

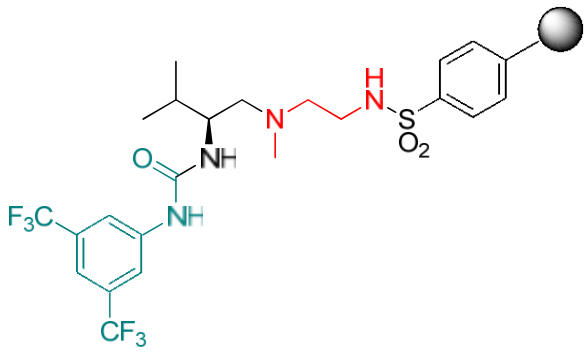
Resin Boc-**18** (1.48 g) was treated with a 4:1 mixture of CH_2Cl_2/TFA (10 mL) as described for Boc-**15** to give 1.04 g of polymer **18** (80% yield) which corresponds to approximately 94 % of ligand incorporation and an effective functionalization, *f* = 1.48 mmol g^{-1}, calculated on the basis of elemental analysis (Found: C: 69.75, H: 8.02, N: 6.23, S: 5.08. **IR** (ATR): 3375, 2928, 1596, 1490, 1453, 1410, 1336, 1158, 1092, 699, 577 cm^{-1}.

Preparation of Resin 19.



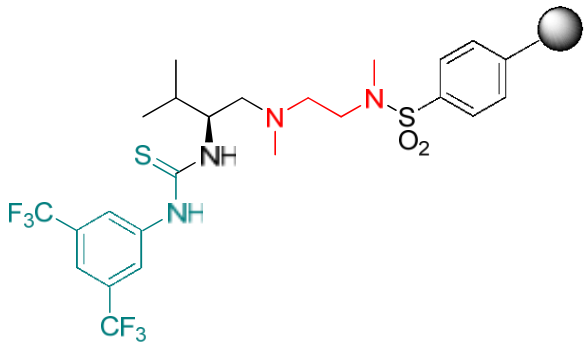
To a suspension of the resin **15** (340 mg, 0.54 mmol) in anhydrous CH_2Cl_2 (3 mL) was added 3,5–bis(trifluoromethyl)phenyl isothiocyanate (0.3 mL, 1.62 mmol, 3 equiv) at 0 °C under argon. The resulting suspension was stirred for overnight at room temperature. The resin was collected by filtration, washed with CH_2Cl_2, and dried under vacuum to give 480 mg of polymer (99% yield). **IR** (ATR): 3294, 2926, 1675, 1535, 1472, 1457, 1379, 1275, 1130, 694, 678 cm^{-1}. An effective functionalization, f = 0.95 mmol g^{-1}, was calculated on the basis of nitrogen and sulfur elemental analysis (C: 52.86, H: 4.97, N: 5.31, S: 6.23).

Preparation of Resin 20.



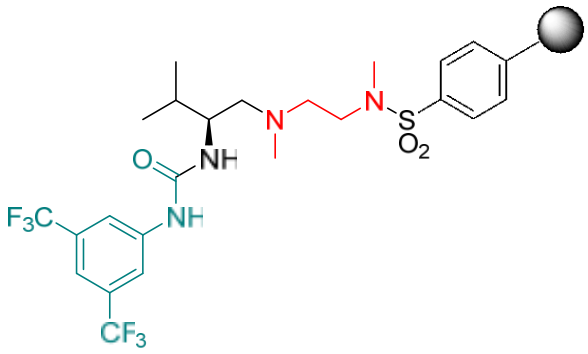
To a suspension of the resin **15** (150 mg, 0.24 mmol) in anhydrous CH_2Cl_2 (1 mL) was added 3,5–bis(trifluoromethyl)phenyl isocyanate (0.12 mL, 0.72 mmol, 3 equiv) at 0 °C under nitrogen atmosphere. The resulting suspension was stirred for overnight at room temperature. The resin was collected by filtration, washed with CH_2Cl_2, and dried under vacuum to give 152 mg of polymer **20**. **IR** (ATR): 3360, 1700, 1554, 1471, 1390, 1276, 1125, 682 cm^{-1}. An effective functionalization, f = 1.11 mmol g^{-1}, was calculated on the basis of nitrogen and sulfur elemental analysis (C: 53.82, H: 4.10, N: 6.21, S: 2.98).

Preparation of Resin 21.



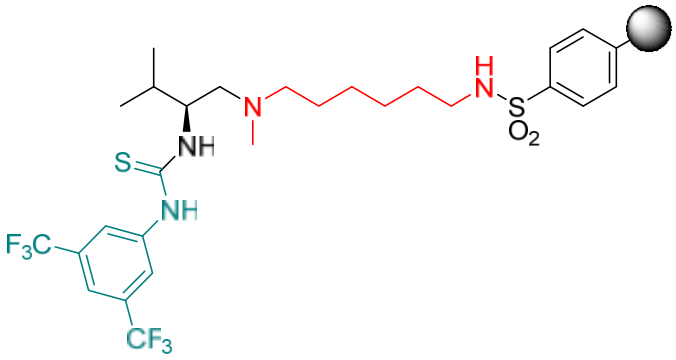
The same procedure for resin **19** was followed, using resin **16** (480 mg, 0.75 mmol) and 3,5–bis(trifluoromethyl)phenyl isothiocyanate (0.41 mL, 2.25 mmol) as reactants. Yield: 642 mg (94%). **IR** (ATR): 3320, 2962, 2930, 1680, 1535, 1472, 1384, 1275, 1125, 886, 699, 678 cm^{-1}. An effective functionalization, f = 1.10 mmol g^{-1}, was calculated on the basis of nitrogen and sulfur elemental analysis (C: 57.73, H: 5.46, N: 6.18, S: 7.16).

Preparation of Resin 22.



The same procedure for resin **19** was followed, using resin **16** (300 mg, 0.47 mmol) and 3,5–bis(trifluoromethyl)phenyl isocyanate (0.09 mL, 0.52 mmol, 1.1 equiv) as reactants. Yield: 363 mg (85%). **IR** (ATR): 3351, 2967, 2936, 1670, 1561, 1472, 1384, 1275, 1125, 880, 704, 683 cm^{-1}. An effective functionalization, f = 1.11 mmol g^{-1}, was calculated on the basis of nitrogen and sulfur elemental analysis (C: 53.57, H: 4.81, N: 6.22, S: 3.42).

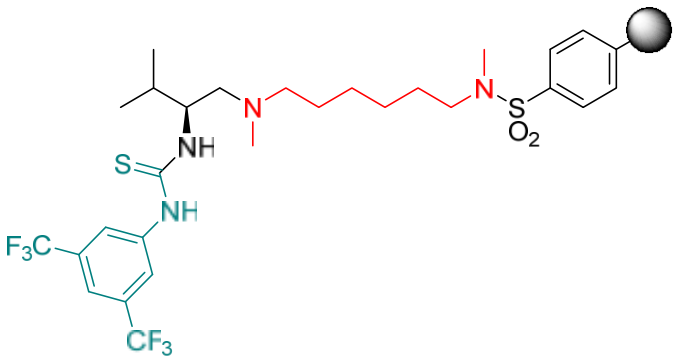
Preparation of Resin 23.



The same procedure for resin **19** was followed, using resin **17** (1.0 g, 1.505 mmol) and 3,5–bis(trifluoromethyl)phenyl isothiocyanate (0.82 mL, 4.51 mmol) as reactants. Yield: 1.365 g (97%). **IR** (ATR): 3283, 2931, 2858, 1675, 1540, 1467, 1379, 1275, 1130, 886, 699, 678, 579 cm^{-1}. An effective functionalization, f = 1.05 mmol g^{-1}, was

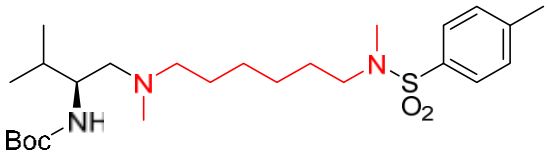
calculated on the basis of nitrogen and sulfur elemental analysis (C: 61.08, H: 6.07, N: 5.89, S: 6.99).

Preparation of Resin 24.



The same procedure for resin **19** was followed, using resin **18** (1.02 g, 1.45 mmol) and 3,5–bis(trifluoromethyl)phenyl isothiocyanate (0.8 mL, 4.35 mmol) as reactants. Yield: 1.28 g (91%). **IR** (ATR): 3311, 2928, 1596, 1532, 1469, 1384, 1336, 1273, 1129, 694, 678, 577 cm^{-1}. An effective functionalization, *f* = 1.04 mmol g^{-1}, was calculated on the basis of nitrogen and sulfur elemental analysis (C: 59.92, H: 6.07, N: 5.80, S: 6.76).

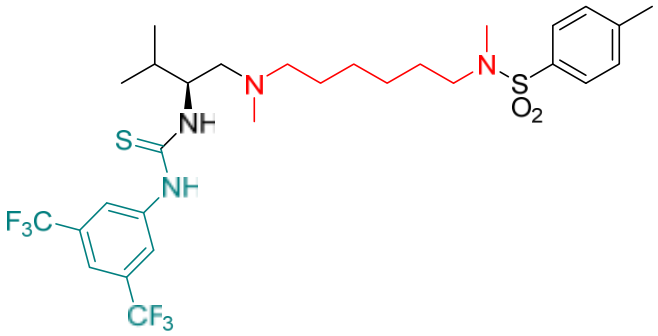
(S)-*tert*-Butyl 1-((6-(N,4-dimethylphenylsulfonamido)hexyl)(methyl)amino)-3-methylbutan-2-ylcarbamate (25).



To a solution of **14** (340 mg, 1.03 mmol) in CH_2Cl_2 (12 mL) at 0 ºC were added Et_3N (0.16 mL, 1.24 mmol, 1.2 equiv), 4-methylbenzenesulfonyl chloride (236 mg, 1.24 mmol, 1.2 equiv), and the mixture was stirred at room temperature for 2h. After addition of aqueous saturated NH_4Cl solution (7 mL), the mixture was extracted with CH_2Cl2 (4 x 5 mL). The extract was dried over anhydrous $MgSO_4$, filtrated, and then the filtrate was evaporated *in vacuo*. The residue was purified by silica gel flash chromatography using ethyl acetate as eluent to afford compound **25** (315 mg, 0.65 mmol, 63%). Colorless oil. $[\alpha]_D^{23}$ = + 1.4 (c = 1.0, $CHCl_3$). $[\alpha]_D^{23}$ = + 3.0 (c = 1.0, MeOH). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.83 (d, 3H, J = 6.9 Hz, $C\underline{H_3}CH$); 0.89 (d, 3H, J = 6.9 Hz, $\underline{CH_3}CH$); 1.29 (m, 4H, $\underline{CH_2}$); 1.39 (m, 2H, $\underline{CH_2}$); 1.41 (s, 9H, $C(\underline{CH_3})_3$); 1.49 (m, 2H, $\underline{CH_2}$); 1.91 (m, 1H, $\underline{CH}(CH_3)_2$); 2.17 (s, 3H, $C\underline{H_3}N$); 2.26 (m, 3H, $\underline{CH_2}N$ and

CHHN); 2.33 (dt, 1H, J = 12.4 Hz, J = 7.3 Hz, CHHN); 2.40 (s, 3H, CH_3Ar); 2.67 (s, 3H, CH_3N); 2.94 (td, 2H, J = 7.0 Hz, J = 1.8 Hz, CH_2NHTs); 3.55 (m, 1H, CHN); 4.56 (br s, 1H, NHBoc); 7.29 (d, 2H, J = 8.1 Hz, Har); 7.64 (d, 2H, J = 8.1 Hz, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 17.0 (CH_3); 18.9 (CH_3); 21.4 (CH_3Ar); 26.4 (CH_2); 26.9 (CH_2); 27.1 (CH_2); 27.5 (CH_2); 28.3 ($CCH_3)_3$); 29.8 ($CH(CH_3)_2$); 34.5 (CH_3N); 42.3 (CH_3N); 49.9 (CH_2NHTs); 52.9 (CHN); 57.7 (CH_2N); 58.7 (CH_2N); 78.7 ($C(CH_3)_3$); 127.3, 129.5 (CHar); 134.5, 143.0 (Car); 156.1 (CO_2tBu). **IR** (ATR): 3390, 2960, 2933, 2859, 2790, 1702, 1458, 1341, 1161, 1087, 736, 715, 651, 545 cm^{-1}. **HRMS** calcd. for $C_{25}H_{45}N_3O_4S$ + H: 484.3204; found: 4843207.

(S)-N-(6-((2-(3-(3,5-bis(trifluoromethyl)phenyl)thioureido)-3-methylbutyl)(methyl) amino)hexyl)-N,4-dimethylbenzenesulfonamide (26).

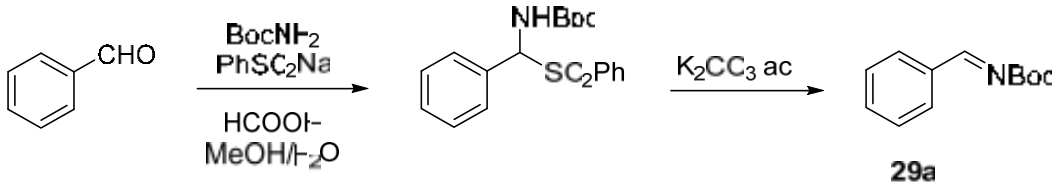


Compound **25** (426 mg, 0.88 mmol) was dissolved in a 1/4 mixture of TFA/CH_2Cl_2 (2 mL) and stirred at rt for 3 h. The mixture was basified with concentrated ammonia solution and extracted with dichloromethane (4 x 10 mL). After removal of the solvent under reduced pressure, the residue was used for the subsequent step without further purification to yield (S)-N-(6-((2-amino-3-methylbutyl)(methyl)amino)hexyl)-N,4-dimethylbenzene sulfonamide as a colorless oil: 305 mg (0.79 mmol, 90%). $[\alpha]_D^{23}$ = + 27.5 (c = 1.0, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 0.91 (d, 3H, J = 6.9 Hz, CH_3CH); 0.93 (d, 3H, J = 6.9 Hz, CH_3CH); 1.31 (m, 4H, CH_2); 1.43 (m, 2H, CH_2); 1.51 (m, 2H, CH_2); 1.59 (m, 1H, $CH(CH_3)_2$); 2.19 (s, 3H, CH_3N); 2.25 (m, 3H, CHHN and CH_2N); 2.39 (m 1H, CHHN); 2.41 (s, 3H, CH_3Ar); 2.68 (s, 3H, CH_3N); 2.70 (m, 1H, $CHNH_2$); 2.92 (br s, 2H, NH_2); 2.95 (t, 2H, J = 7.2 Hz, CH_2NHTs); 7.30 (d, 2H, J = 8.2 Hz, Har); 7.64 (d, 2H, J = 8.2 Hz, Har). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 18.2 (CH_3); 19.0 (CH_3); 21.3 (CH_3Ar); 26.2 (CH_2); 26.7 (CH_2); 27.0 (CH_2); 27.3 (CH_2); 31.4 ($CH(CH_3)_2$); 34.4 (CH_3N); 42.1 (CH_3N); 49.8 (CH_2NHTs); 53.8 (CHN); 57.9 (CH_2N); 61.3 (CH_2N); 127.2, 129.4 (CHar); 134.3, 143.0 (Car). **IR** (ATR): 3374, 2933, 2859, 2790, 1692,

1458, 1336, 1161, 816, 715, 651, 550 cm^{-1}. **HRMS** calcd. for $C_{20}H_{37}N_3O_2S$ + H: 384.2680; found: 384.2679.

To a solution of this compound (258 mg, 0.67 mmol)) in anhydrous CH_2Cl_2 (2 mL) was added 3,5–bis(trifluoromethyl)phenyl isothiocyanate (0.14 mL, 0.74 mmol, 1.1 equiv) at 0 °C under argon. The resulting solution was stirred for overnight at room temperature. The reaction was concentrated in *vacuo* and the residue was purified by flash chromatography (CH_2Cl_2 to CH_2Cl_2/MeOH: 30/1) to yield **26**: 268 mg (0.41 mmol, 61%). Colorless oil. $[\alpha]_D^{23}$ = -19.4 (c = 1.0, $CHCl_3$). **^{1}H-NMR** (400 MHz, $CDCl_3$) δ 1.04 (d, 6H, J = 6.8 Hz, $\underline{CH_3}CH$); 1.29 (m, 4H, $\underline{CH_2}$); 1.43 (m, 4H, $\underline{CH_2}$); 1.94 (m, 1H, $\underline{CH}(CH_3)_2$); 2.42 (s, 6H, $C\underline{H_3}N$ and $C\underline{H_3}Ar$); 2.53 (m, 1H, $C\underline{HH}N$); 6.64 (s, 3H, $\underline{CH_3}N$); 2.70 (m 1H, $C\underline{HH}N$); 2.79 (m, 1H, $\underline{CH}HN$); 2.90 (m, 2H, $\underline{CH_2}NHTs$); 2.97 (m, 1H, $C\underline{HH}N$); 3.58 (m, 1H, $\underline{CH}N$); 6.26 (br s, 1H, $\underline{NH}$); 7.31 (d, 2H, J = 8.0 Hz, $\underline{H}ar$); 7.58 (s, 1H, Har); 7.64 (d, 2H, J = 8.0 Hz, $\underline{H}ar$); 8.02 (s, 2H, $\underline{H}ar$); 13.16 (br s, 1H, $\underline{NH}$). **^{13}C-NMR** (101 MHz, $CDCl_3$) δ 18.0 ($\underline{CH_3}$); 18.3 ($\underline{C}H_3$); 21.2 ($\underline{C}H_3Ar$); 25.9 ($\underline{C}H_2$); 26.6 ($\underline{C}H_2$); 26.7 ($\underline{C}H_2$); 27.0 ($\underline{C}H_2$); 31.3 ($\underline{CH}(CH_3)_2$); 34.3 ($\underline{C}H_3N$); 42.1 ($\underline{C}H_3N$); 49.5 ($\underline{C}H_2NHTs$); 58.0 ($\underline{C}H_2N$); 60.0 ($\underline{C}HN$); 62.3 ($\underline{C}H_2N$); 117.1 ($\underline{C}Har$); 122.8 ($\underline{C}Har$); 123.0 ($\underline{C}F_3$); 127.1, 129.5 ($\underline{C}Har$); 131.3 ($\underline{CC}F_3$); 133.9, 142.0, 143.2 ($\underline{C}ar$); 182.8 ($\underline{C}$=S). **^{19}F-NMR** (376 MHz, $CDCl_3$): -62.97. **IR** (ATR): 3327, 2931, 2860, 1674, 1538, 1467, 1387, 1340, 1274, 1128, 883, 751, 549 cm^{-1}. **HRMS** calcd. for $C_{29}H_{40}F_6N_4O_2S_2$ + H: 655.2570; found: 655.2580.

General procedure for the preparation of N-Boc imines – illustrated for the synthesis of imine 29a.[4]

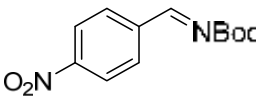


29a

Preparation of α*-sulfonyl amine:* A mixture of benzaldehyde (2.10 mL, 20.0 mmol, 2 equiv), *tert*-butyl carbamate (1.17 g, 10.0 mmol, 1 equiv), benzenesulfinic acid sodium salt (4.11 g, 25.0 mmol, 2.5 equiv) and formic acid (0.760 mL, 20.0 mmol, 2 equiv) in methanol (10 mL) and water (20 mL) was stirred at room temperature for 24 h. The resulting precipitate was filtered and washed well with diethyl ether. After drying under vacuum, the product was obtained as a white solid (2.61 g, 7.50 mmol, 75%). Mp 169-170 ºC. **^{1}H-NMR** (500 MHz, $CDCl_3$) δ 1.22 (s, 9H, C$\underline{H}_3$), 5.75 (d, *J* = 10.0 Hz, 1H, $\underline{CH}$N), 5.90 (d, *J* = 10.0 Hz, 1H, $\underline{NH}$), 7.34-7.47 (m, 5H, $\underline{Ha}$r), 7.47-7.56 (m, 2H, $\underline{Ha}$r), 7.58-7.68 (m, 1H, $\underline{H}$ar), 7.89 (d, *J* = 7.2 Hz, 2H, $\underline{H}$ar).

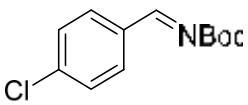
Preparation of N-Boc imine ***29a****:* To a solution of α-amido sulfone (347 mg, 1.0 mmol, 1 equiv) in CH_2Cl_2 (16 mL) was added *aq*. 1.4 M K_2CO_3 solution (16 mL). The resulting mixture was stirred at rt vigorously for 5 hours. The aqueous layer was separated and extracted with CH_2Cl_2 (2 × 20 mL). The combined organic extracts were dried (Na_2SO_4), filtered and concentrated to give imine **29a** as a colorless oil (185 mg, 0.9 mmol, 90%). **^{1}H-NMR** (500 MHz, $CDCl_3$): δ 1.59 (s, 9H, C$\underline{H}_3$); 7.45-7.55 (m, 3H, $\underline{Ha}$r); 7.91 (m, 2H, $\underline{H}$ar); 8.87 (s, 1H, $\underline{CH}$=N).

(*E*)-*tert*-Butyl 4-nitrobenzylidenecarbamate (29b). [4]



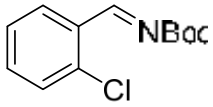
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.58 (s, 9H, $\underline{CH}_3$), 8.04 (d, *J* = 8.7 Hz, 2H, $\underline{H}$ar), 8.30 (d, *J* = 9 Hz, 2H, $\underline{H}$ar), 8.85 (s, 1H, C$\underline{H}$=N).

(*E*)-*tert*-Butyl 4-chlorobenzylidenecarbamate (29c). [6]



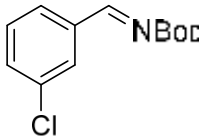
^{1}H-NMR (500 MHz, $CDCl_3$) δ 1.59 (9H, s, $\underline{CH_3}$), 7.45 (d, *J* = 8.4 Hz, 2H, <u>H</u>ar), 7.85 (d, 2H, *J* = 8.4 Hz, <u>H</u>ar), 8.83 (s, 1H, C<u>H</u>=N).

(*E*)-*tert*-Butyl 2-chlorobenzylidenecarbamate (29d). [6]



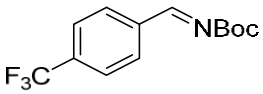
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.57 (s, 9H, $C\underline{H_3}$), 7.31 (m, 1H, <u>H</u>ar), 7.42 (m, 2H, <u>H</u>ar), 8.16 (d, *J* = 7.5 Hz, 1H, <u>H</u>ar), 9.25 (s, 1H, <u>CH</u>=N).

(*E*)-*tert*-Butyl 3-chlorobenzylidenecarbamate (29e). [6]



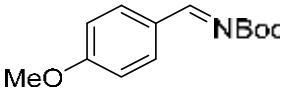
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.56 (s, 9H, $C\underline{H_3}$), 7.37 (t, *J* = 7.5 Hz, 1H, <u>H</u>ar), 7.48 (t, *J* = 7.2 Hz, 1H, <u>H</u>ar), 7.72 (d, *J* = 7.2 Hz, 1H, <u>H</u>ar), 7.91 (s, 1H, <u>H</u>ar), 8.76 (s, 1H, <u>CH</u>=N).

(*E*)-*tert*-Butyl 4-trifluoromethylbenzylidenecarbamate (29f). [4]



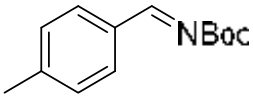
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.60 (s, 9H, $\underline{CH_3}$), 7.73 (d, *J* = 8.7 Hz, 2H, <u>H</u>ar), 8.02 (d, *J* = 8.7 Hz, 2H, <u>H</u>ar), 8.86 (s, 1H, <u>CH</u>=N).

(*E*)-*tert*-Butyl 4-methoxybenzylidenecarbamate (29g). [4]



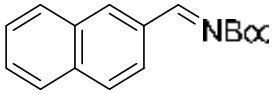
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.56 (s, 9H, $C\underline{H_3}$), 3.85 (s, 3H, $C\underline{H_3}$), 6.94 (d, J = 8.7 Hz, 2H, <u>H</u>ar), 7.87 (d, *J* = 8.7 Hz, 2H, <u>H</u>ar), 8.86 (s, 1H, <u>CH</u>=N).

(*E*)-*tert*-Butyl 4-methylbenzylidenecarbamate (29h). [4]



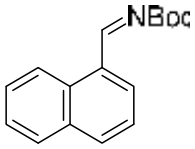
^{1}H-NMR (500 MHz, $CDCl_3$) δ 1.59 (s, 9H, $\underline{CH_3}$), 2.42 (3H, s, $C\underline{H_3}$), 7.27 (d, 2H, *J* = 7.7 Hz, Har), 7.81 (2H, d, *J* = 8.1 Hz, Har), 8.87 (1H, s, CH=N).

(*E*)-*tert*-Butyl naphthalen-2-ylmethylenecarbamate (29i).[5]



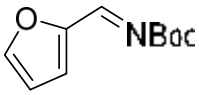
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.60 (s, 9H, $C\underline{H_3}$), 7.59 (m, 2H, Har), 7.85-8.93 (m, 3H, Har), 8.07 (dd, *J* = 8. 7, 1.5 Hz, 1H, Har), 8.27 (s, 1H, Har), 9.03 (s, 1H, CH=N).

(*E*)-*tert*-Butyl naphthalen-1-ylmethylenecarbamate (29j).[6]



^{1}H-NMR (500 MHz, $CDCl_3$) δ 1.63 (s, 9H, $C\underline{H_3}$), 7.56-7.58 (m, 2H, Har), 7.66 (m, 1H, Har), 7.93 (d, *J* = 7.7 Hz, 1H, Har), 8.05 (d, *J* = 8.4 Hz, 1H , Har), 8.17 (d, *J* = 7.0 Hz, 1H, Har), 8.93 (d, *J* = 8.4 Hz, 1H, Har), 9.54 (s, 1H, CH=N).

(*E*)-*tert*-Butyl furan-2-ylmethylenecarbamate (29k). [5]



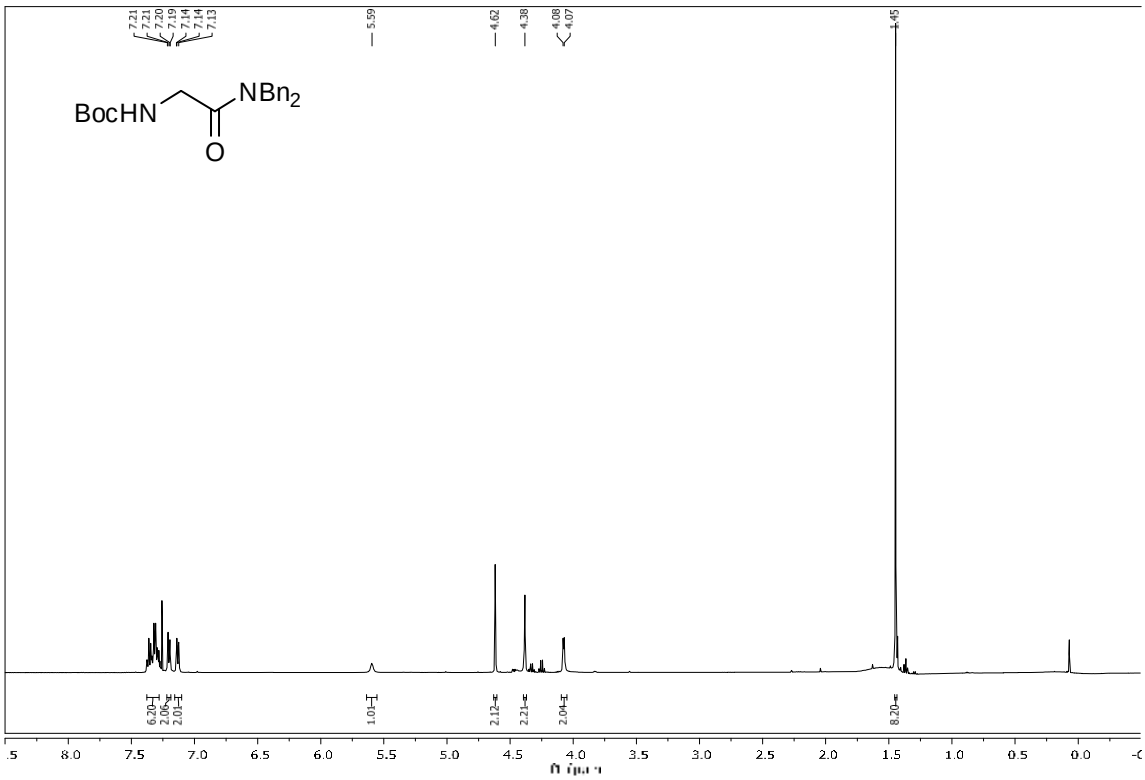
^{1}H-NMR (500 MHz, $CDCl_3$): δ 1.57 (s, 9H, $\underline{CH_3}$), 6.60 (s, 1H, Har), 7.24 (s, 1H, Har), 7.69 (s, 1H, Har), 8.77 (s, 1H, CH=N).

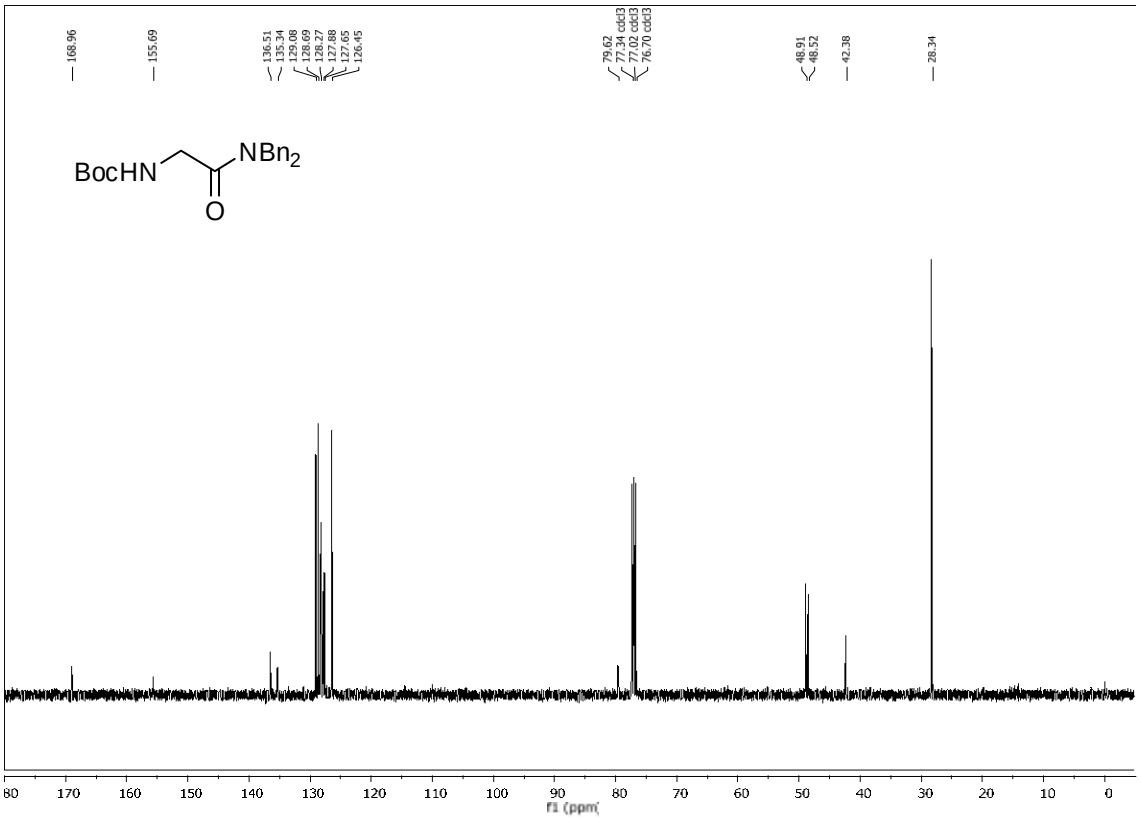
References:

[1] PCT Int. Appl. **1997**, WO 9724343 A1 19970710. CAS: 193350-70-8.
[2] J. Krapcho, C. F.Turk, *Journal of Medicinal Chemistry*, **1963**, 6(5), 547-50. CAS: 84199-02-0.
[3] U. Azzena, G. Dettori, L. Pisano and I. Siotto, *Tetrahedron*, **2005**, 31, 3177–3182. CAS: 102-11-4.
[4] M. T. Robak, M. Trincado, J.A. Ellman, *J. Am. Chem. Soc*., **2007**, *129*, 15110.
[5] Helena M. Lovick, Forrest E. Michael *Tetrahedron*, **2009**, 50, 1016.
6 C. Rampalakos, W. Wulff, *Adv. Synth. Catal*. **2008**, *350*, 1785.

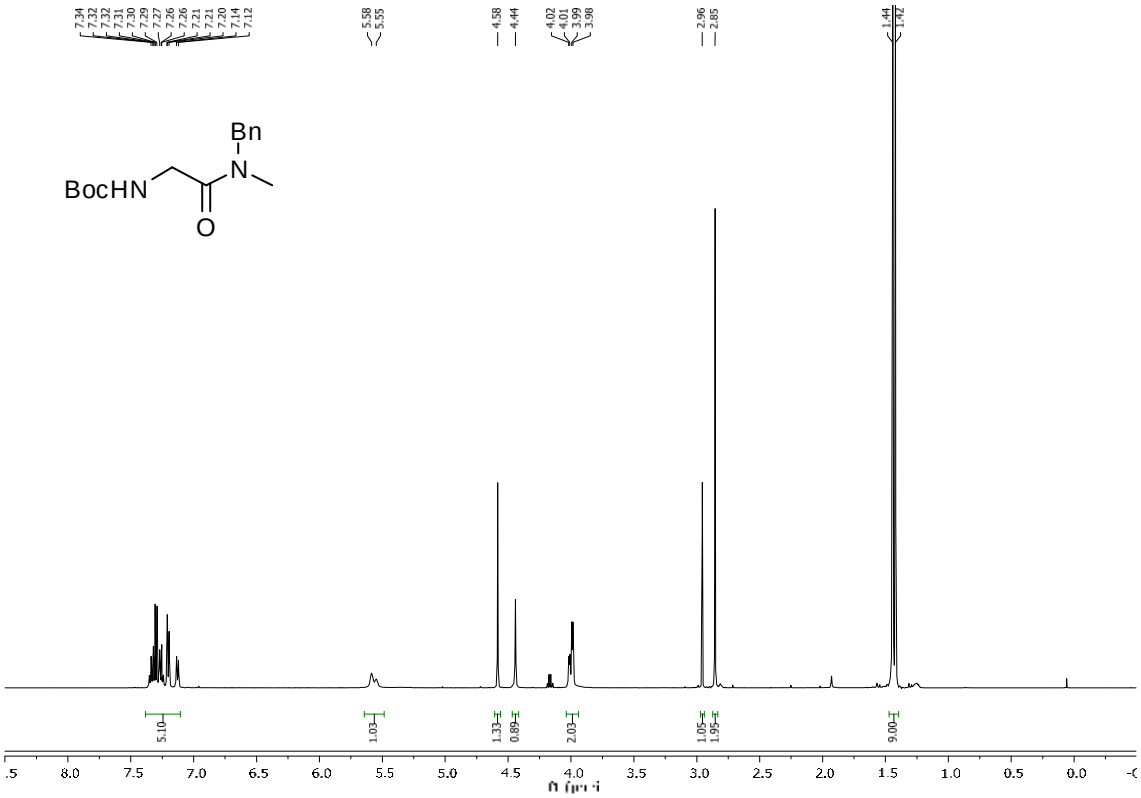
2. NMR Spectra for New Compounds.

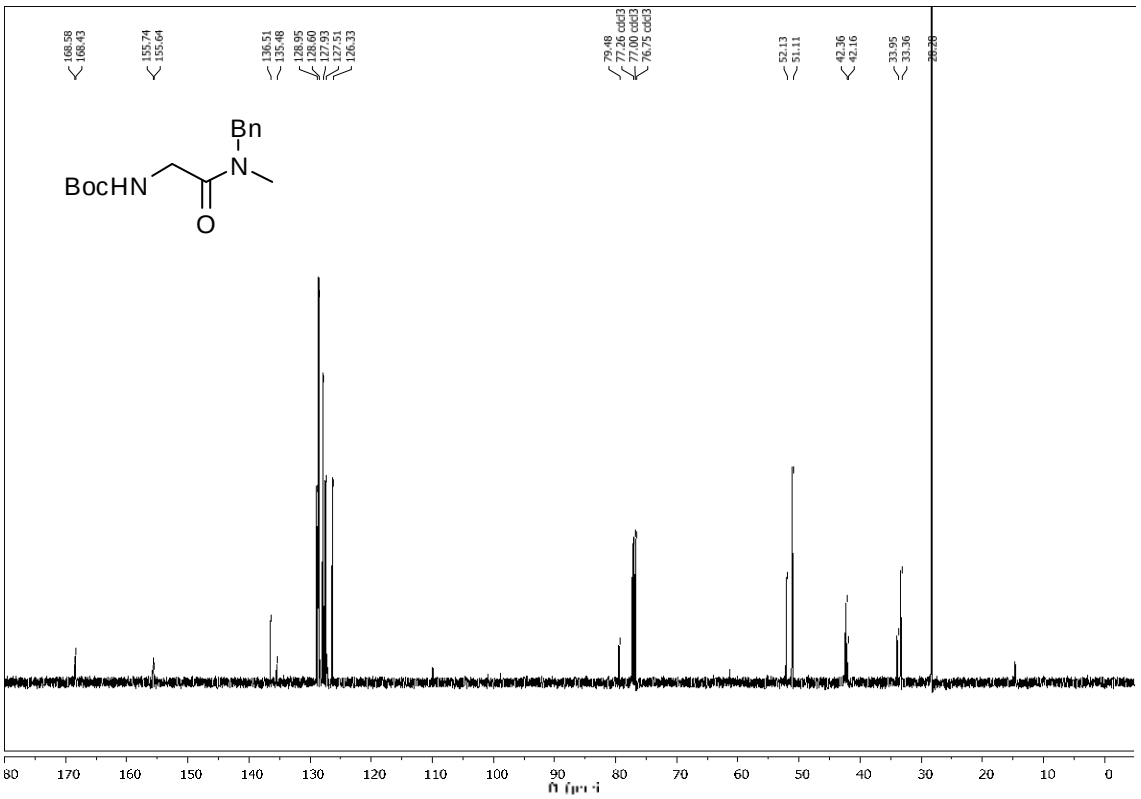
2-(*tert*-Butoxycarbonylamino)-*N*,*N*-dibenzylacetamide (1).



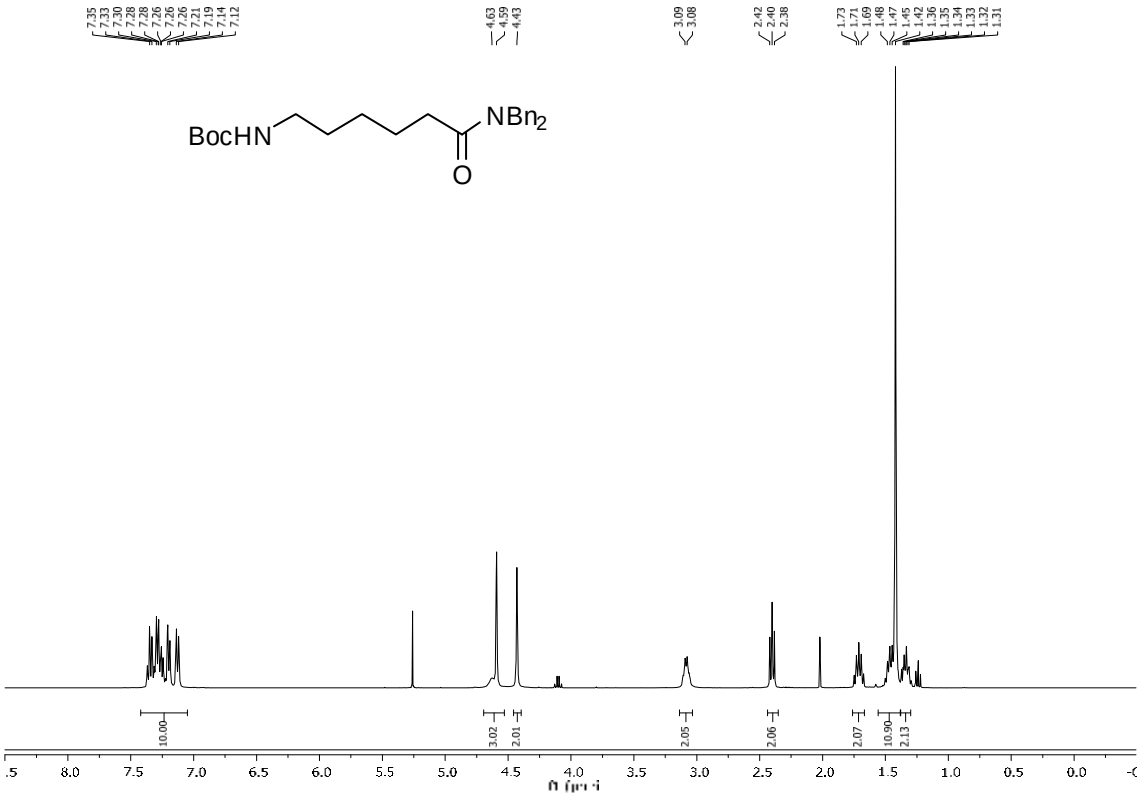


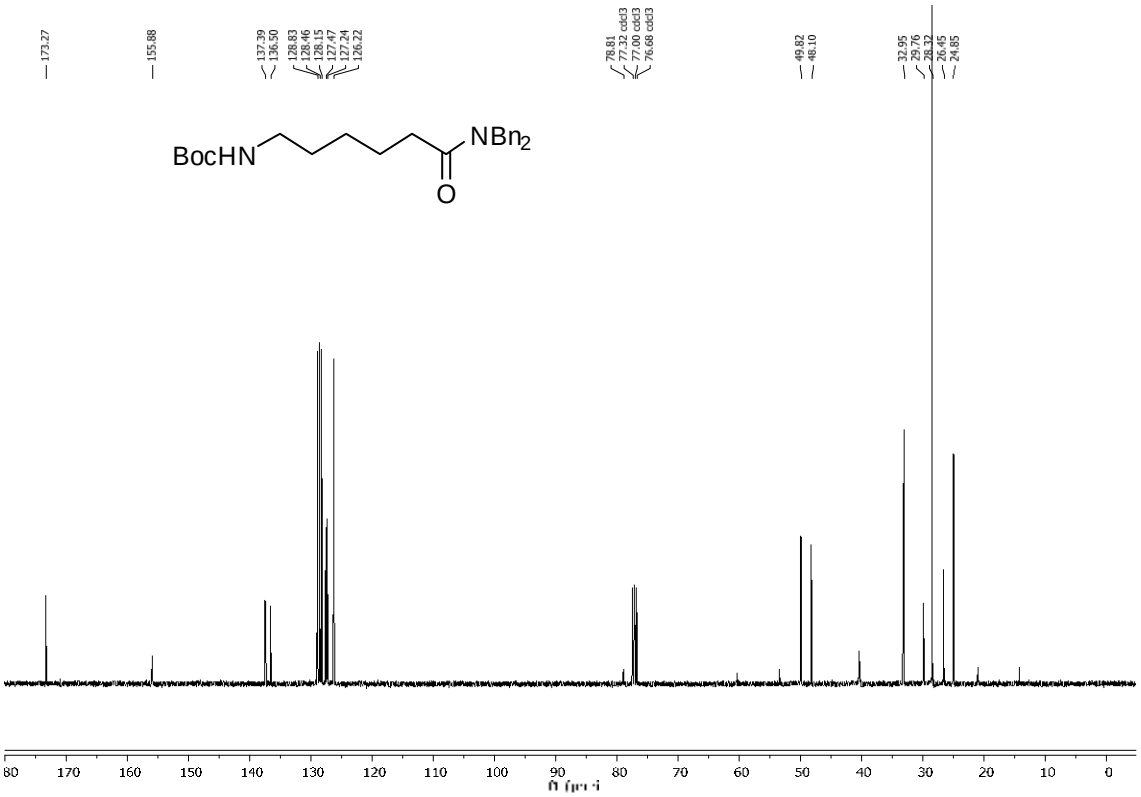
2-(*tert*-Butoxycarbonylamino)-N-benzyl-N-methylacetamide (2).



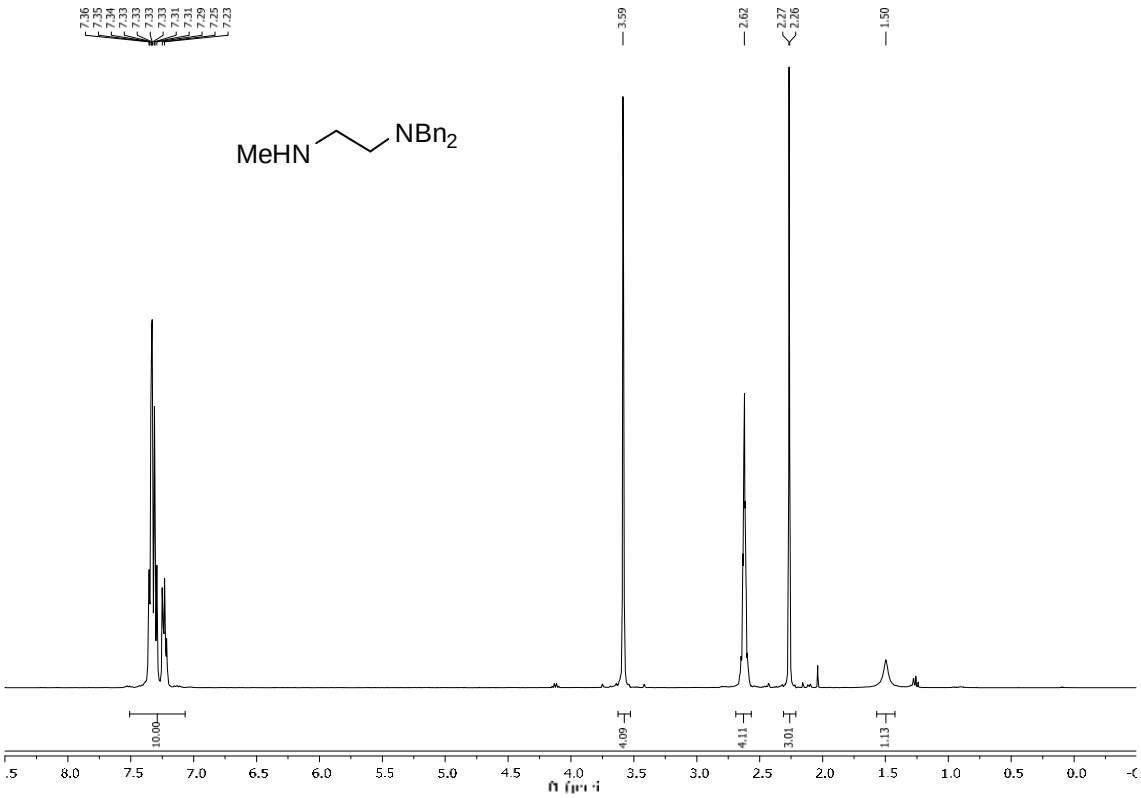


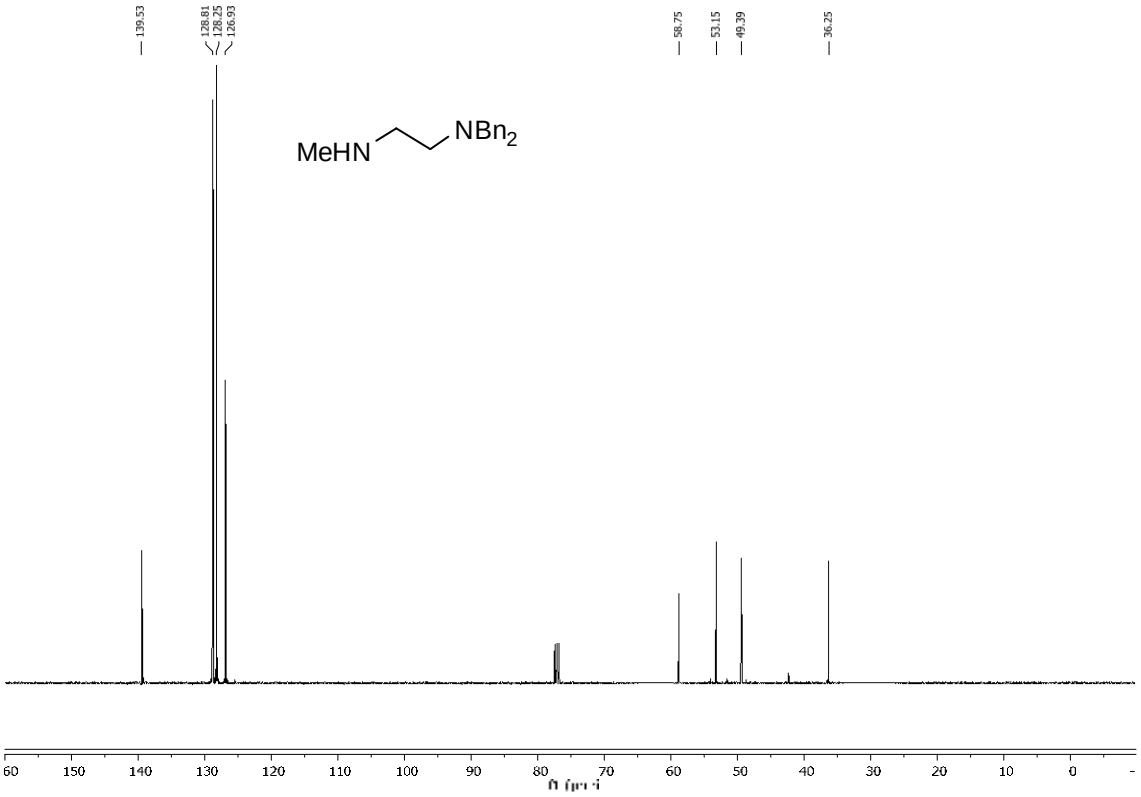
6-(*tert*-Butoxycarbonylamino)-*N*,*N*-dibenzylhexanamide (3).



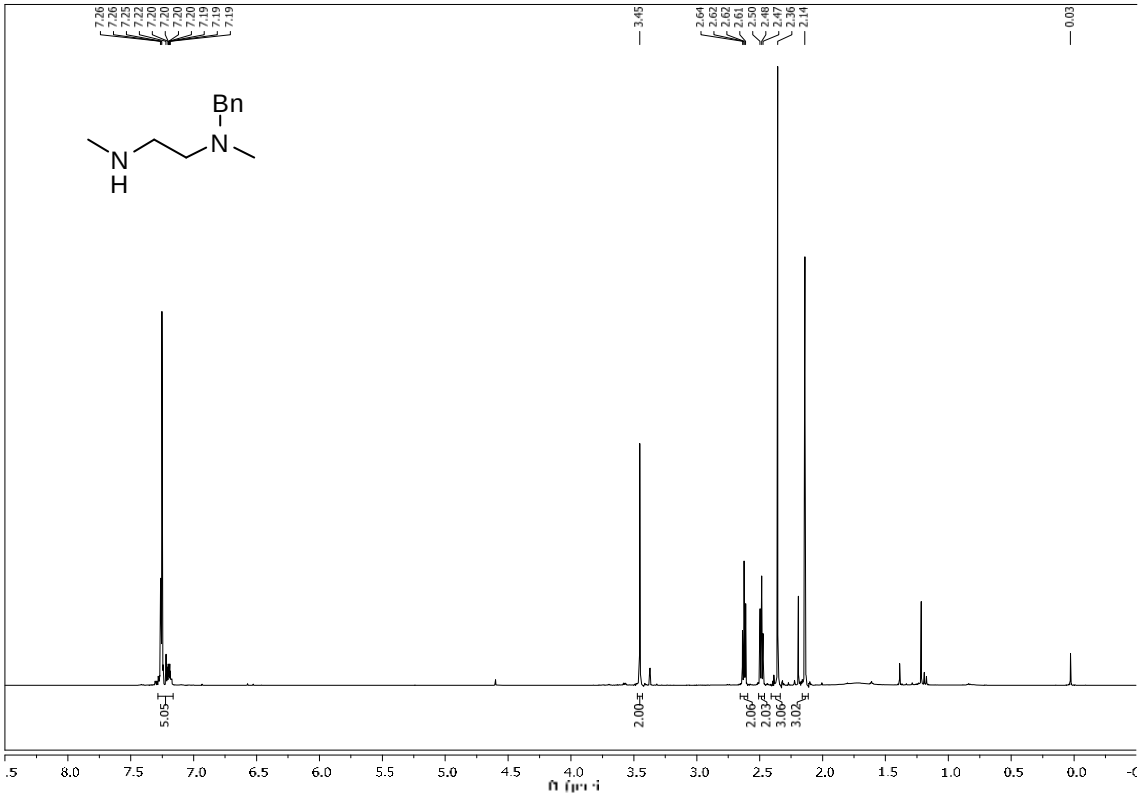


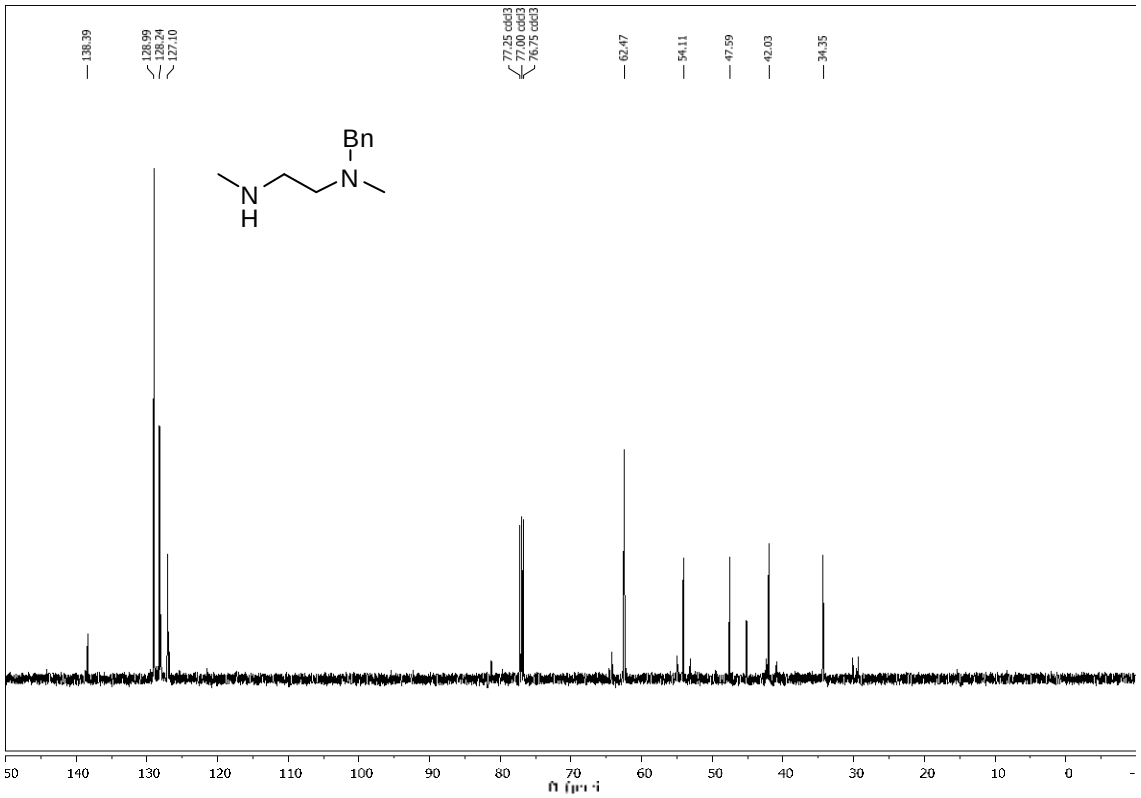
N^1,N^1-dibenzyl-N^2-methylethane-1,2-diamine (4).



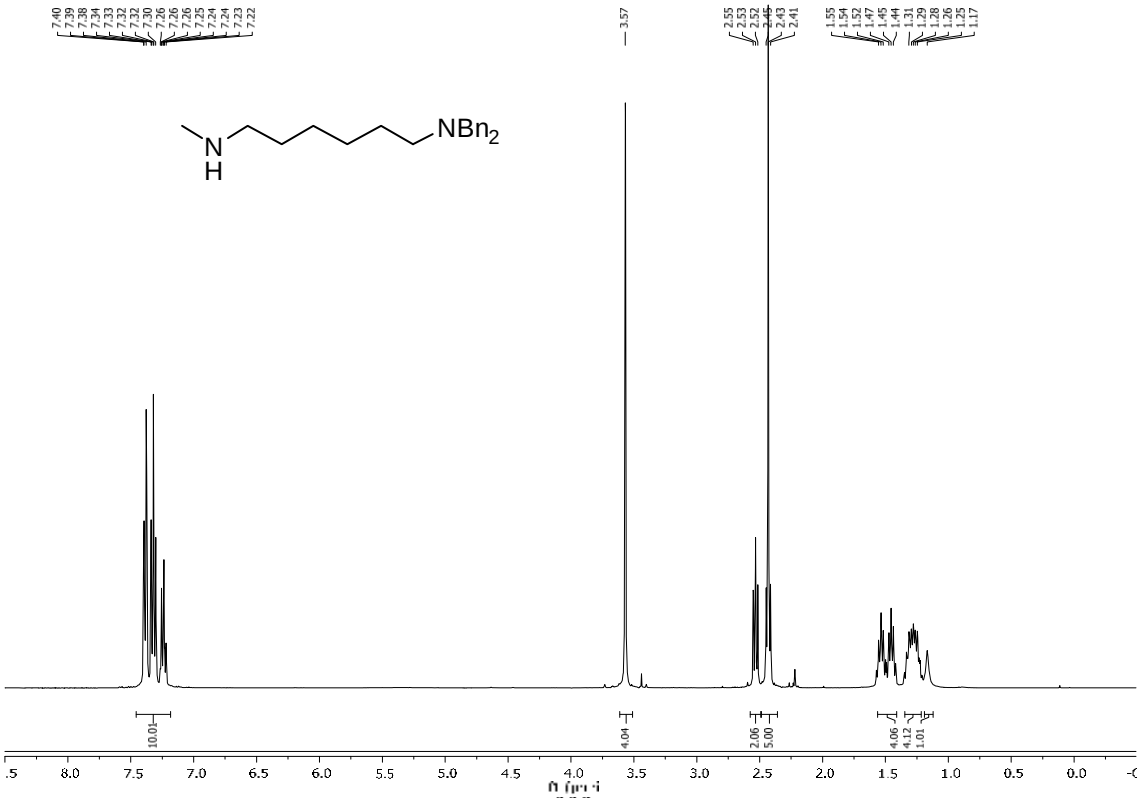


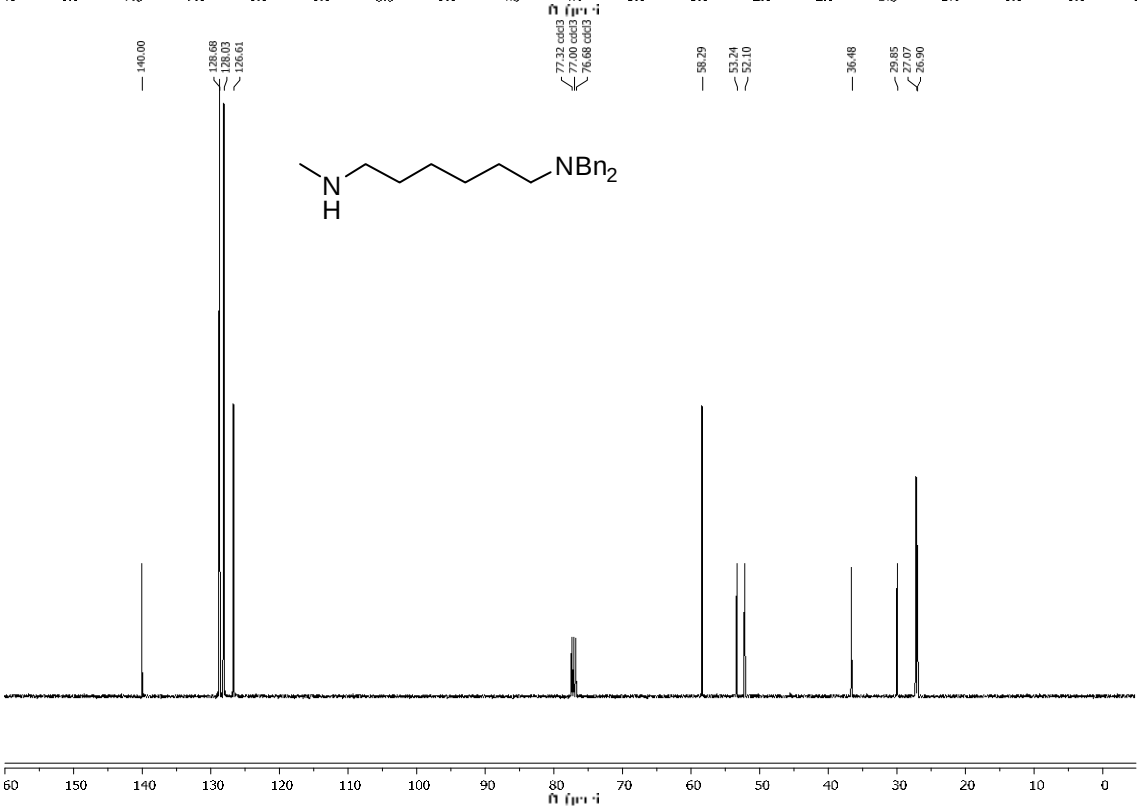
N^1-Benzyl-N^1,N^2-dimethylethane-1,2-diamine (5).



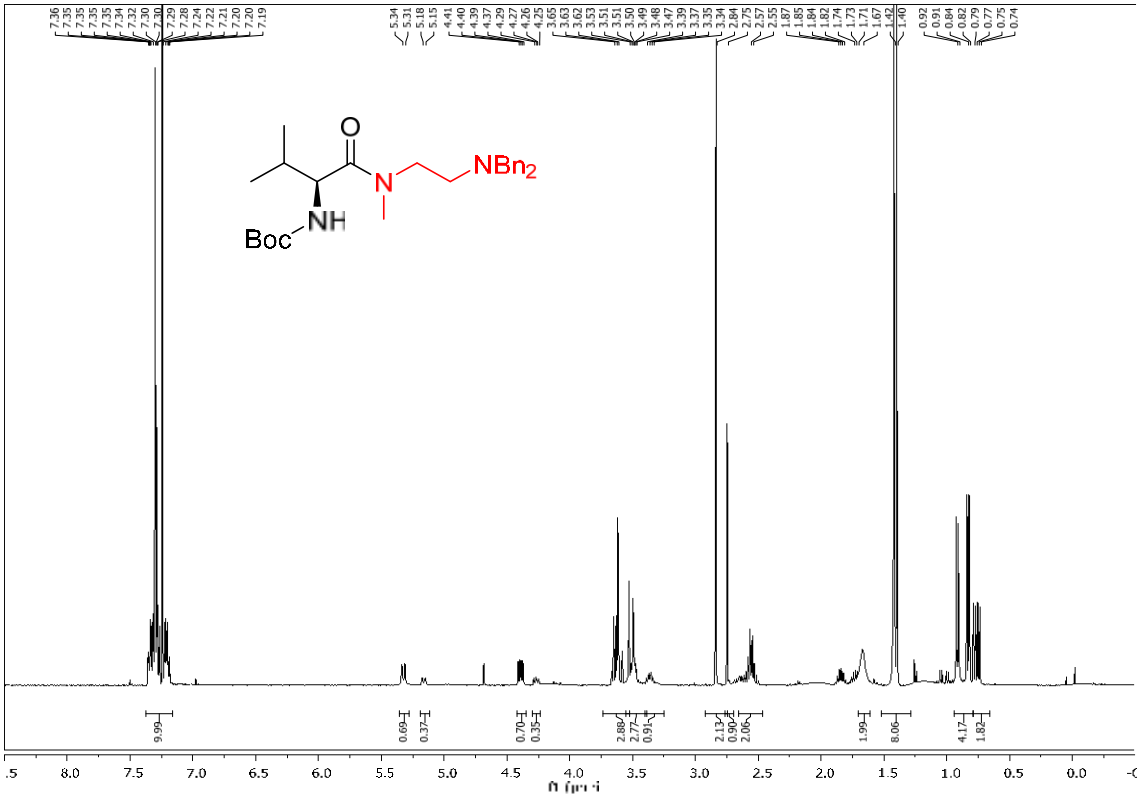


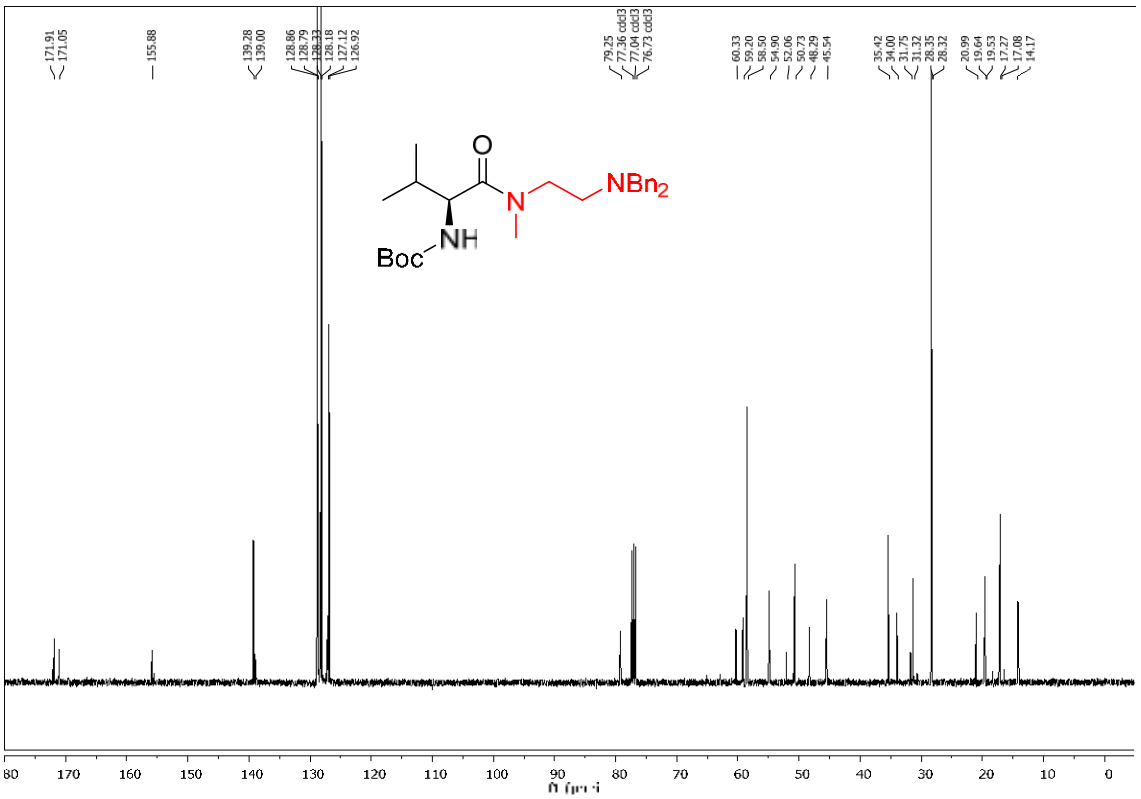
N^1, N^1-Dibenzyl-N^6-methylhexane-1,6-diamine (6).



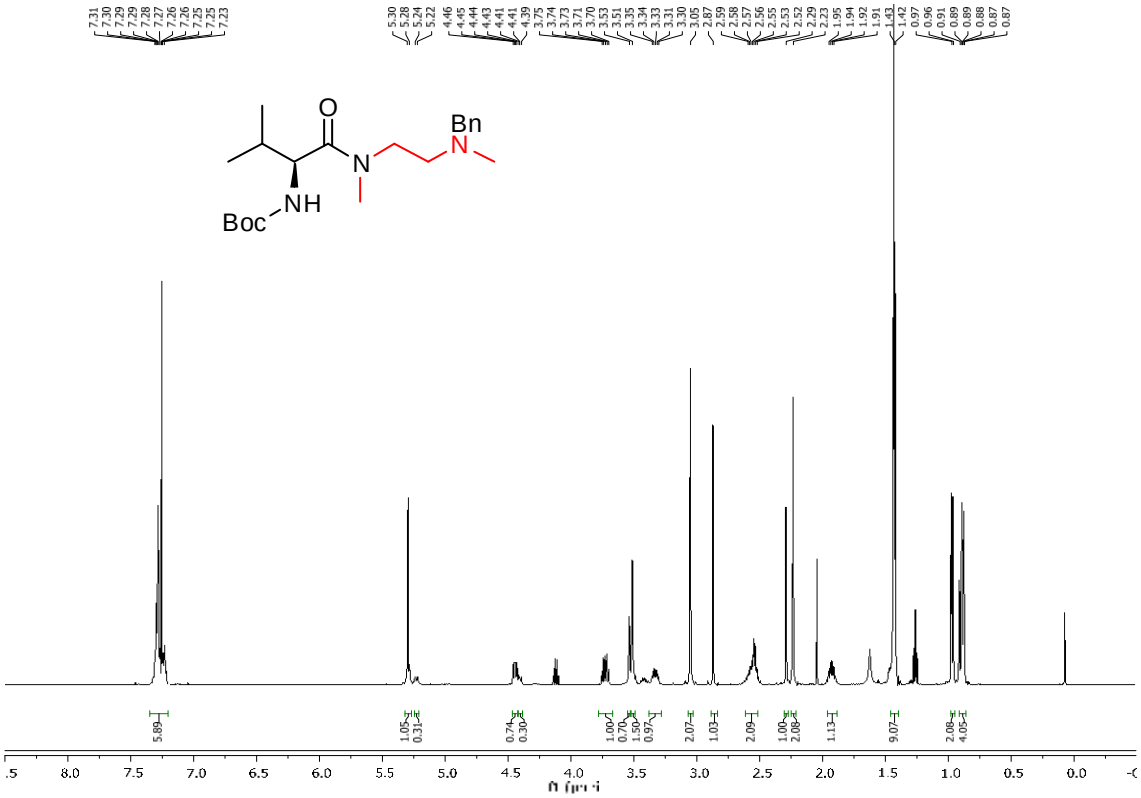


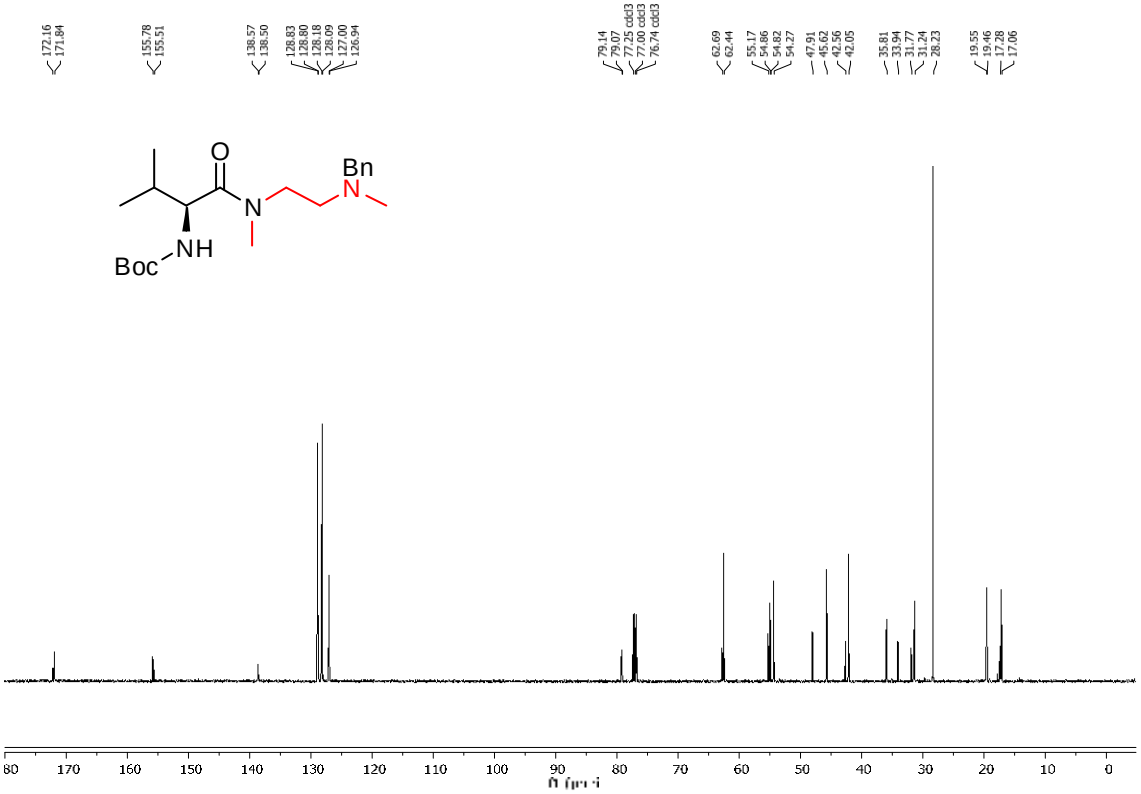
(S)-Boc-N-(2-(dibenzylamino)ethyl)-N-methylvalinamide (7).



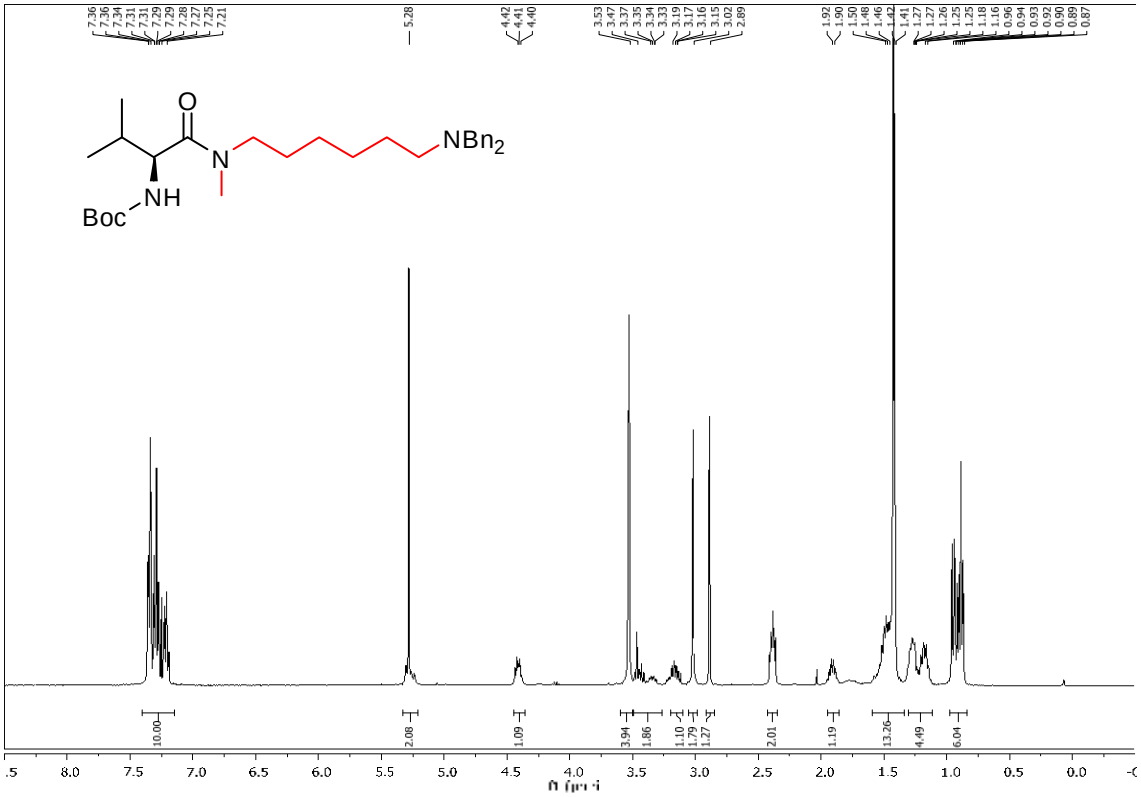


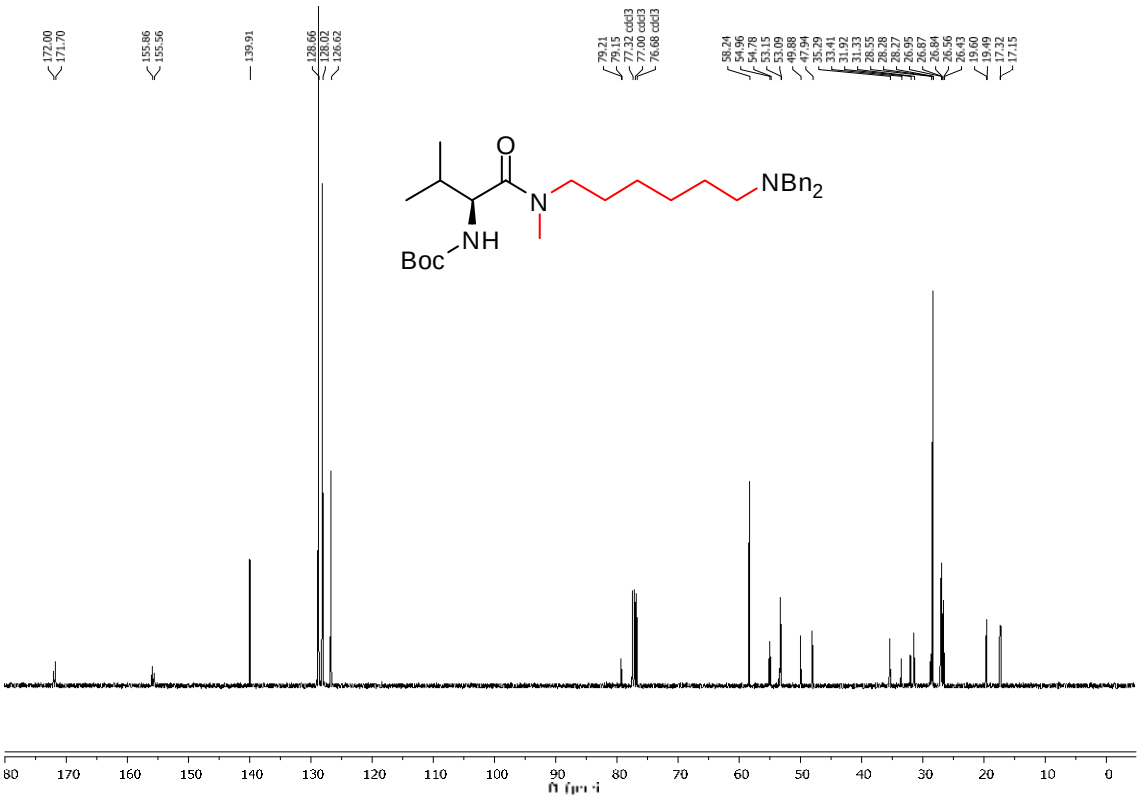
(S)-Boc-N-(2-(benzyl(methyl)amino)ethyl)-N-methylvalinamide (8).



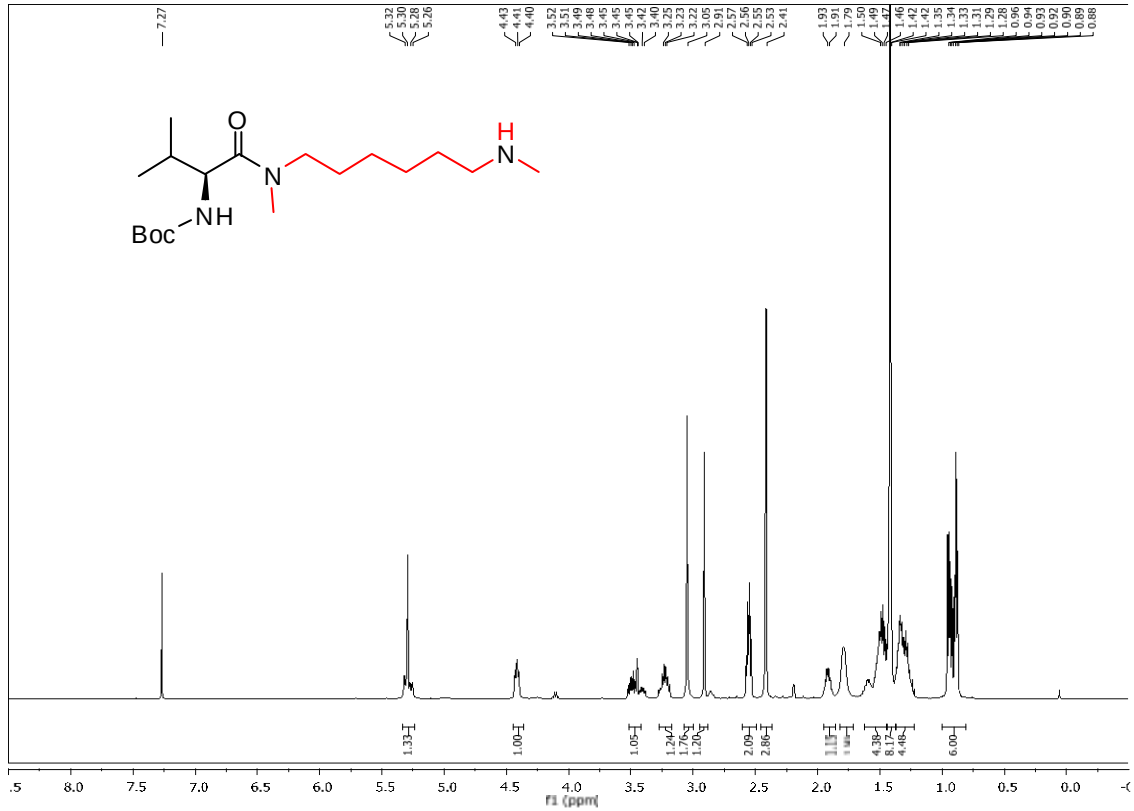


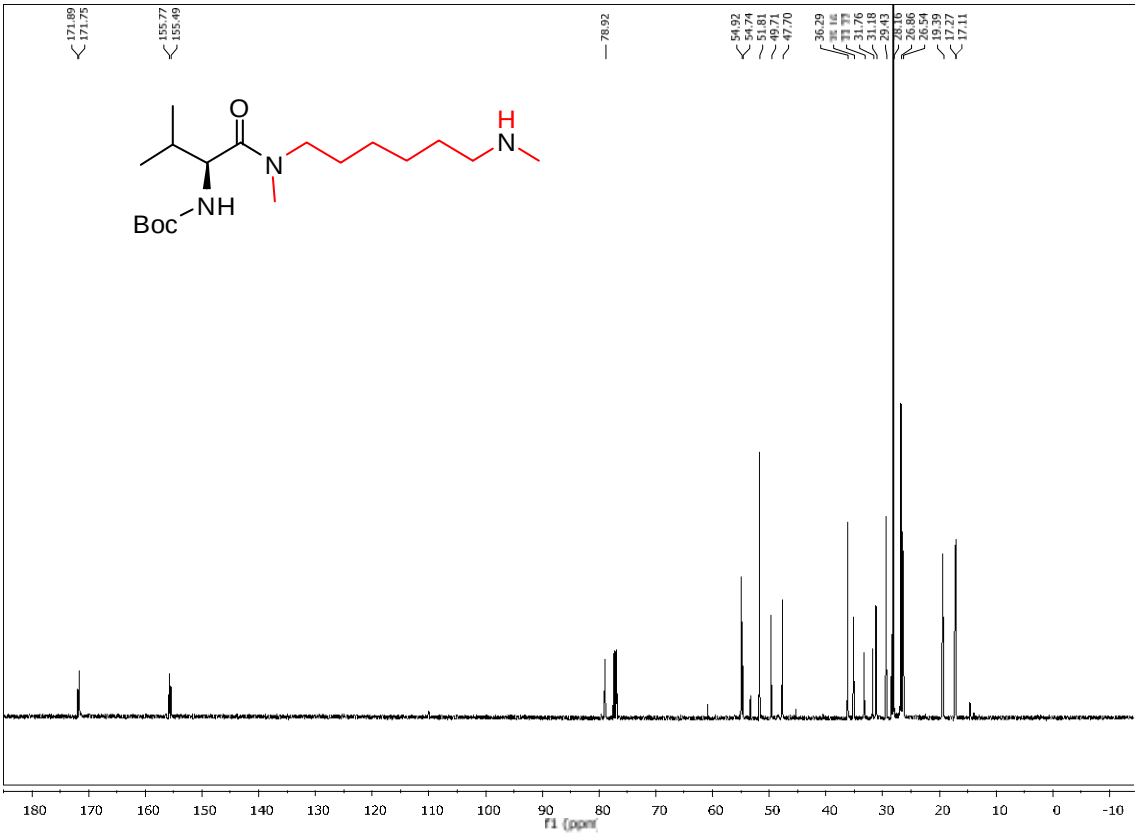
(S)-Boc-N-(6-(dibenzylamino)hexyl)-N-methylvalinamide (9).



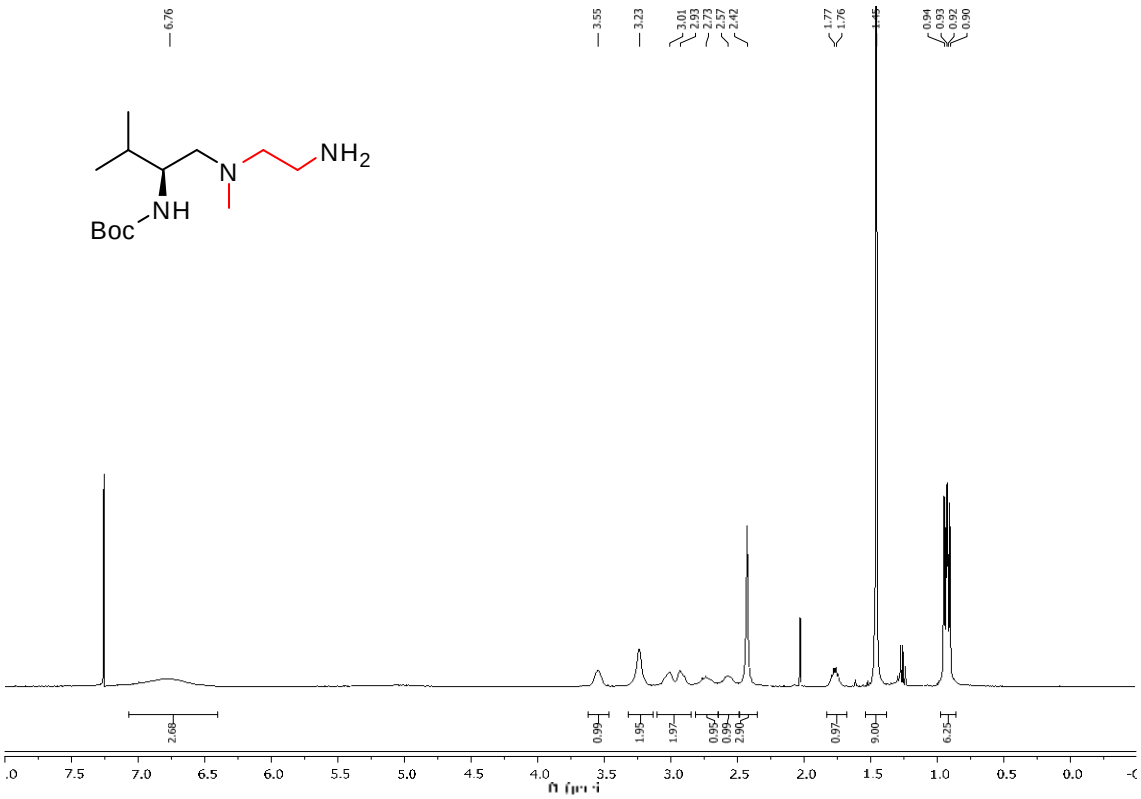


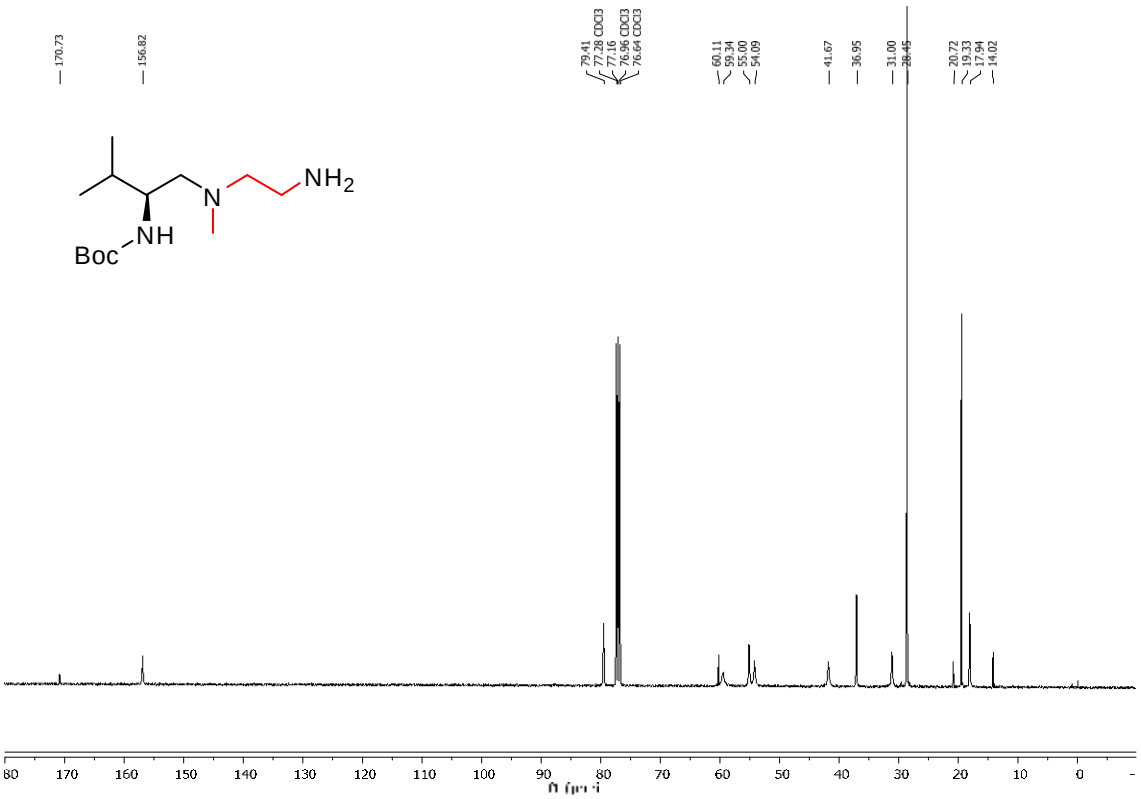
(*S*)-Boc-N-methyl-N-(6-methylamino)hexyl)valinamide (10).



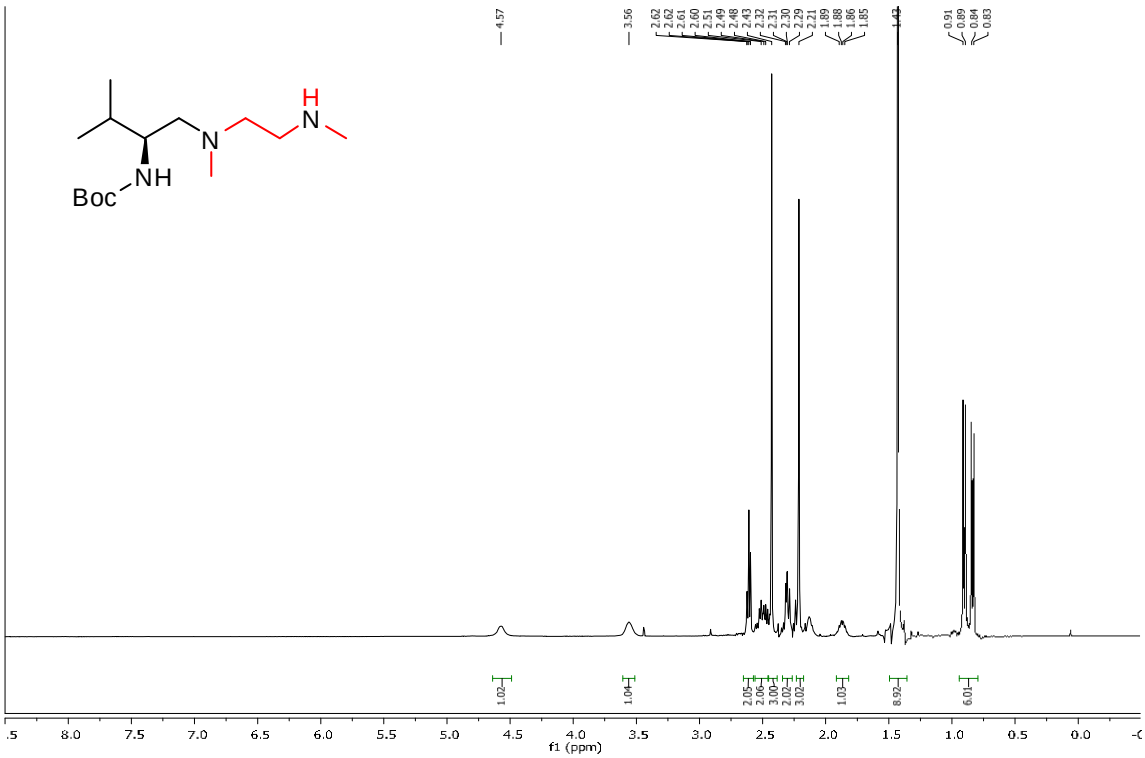


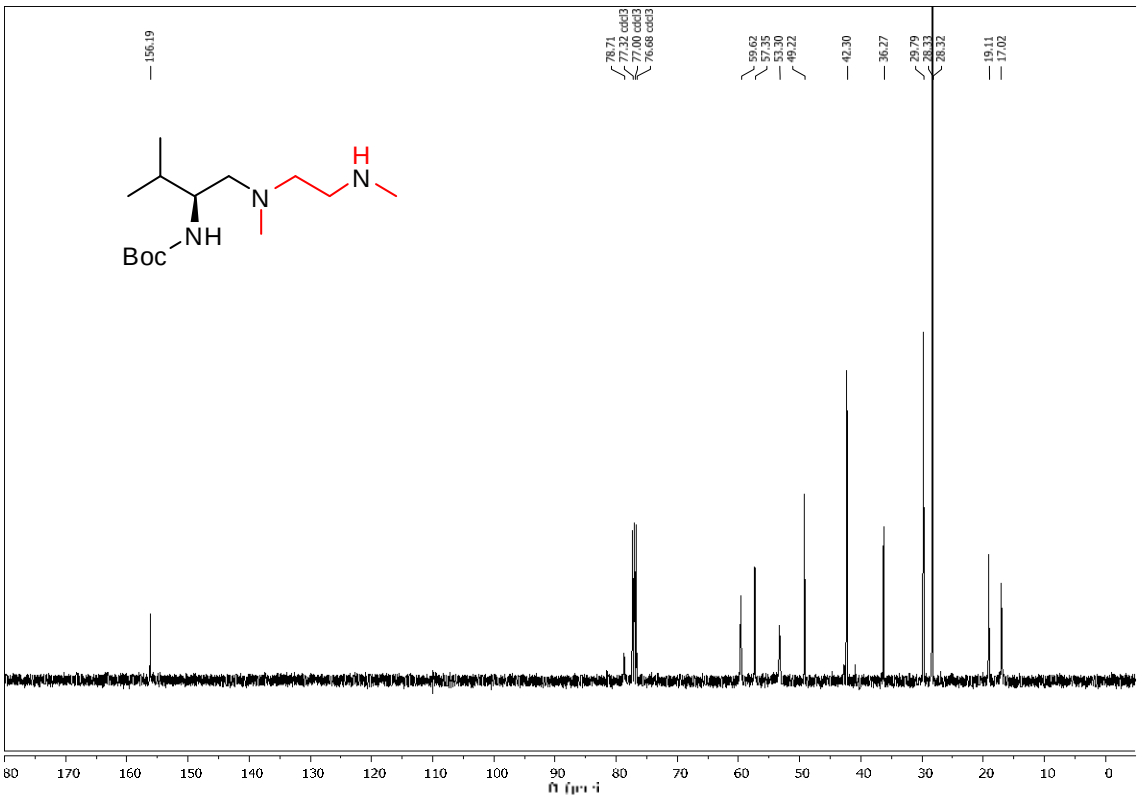
(S)-tert-Butyl (1-((2-aminoethyl)(methyl)amino)-3-methylbutan-2-yl)carbamate (11).



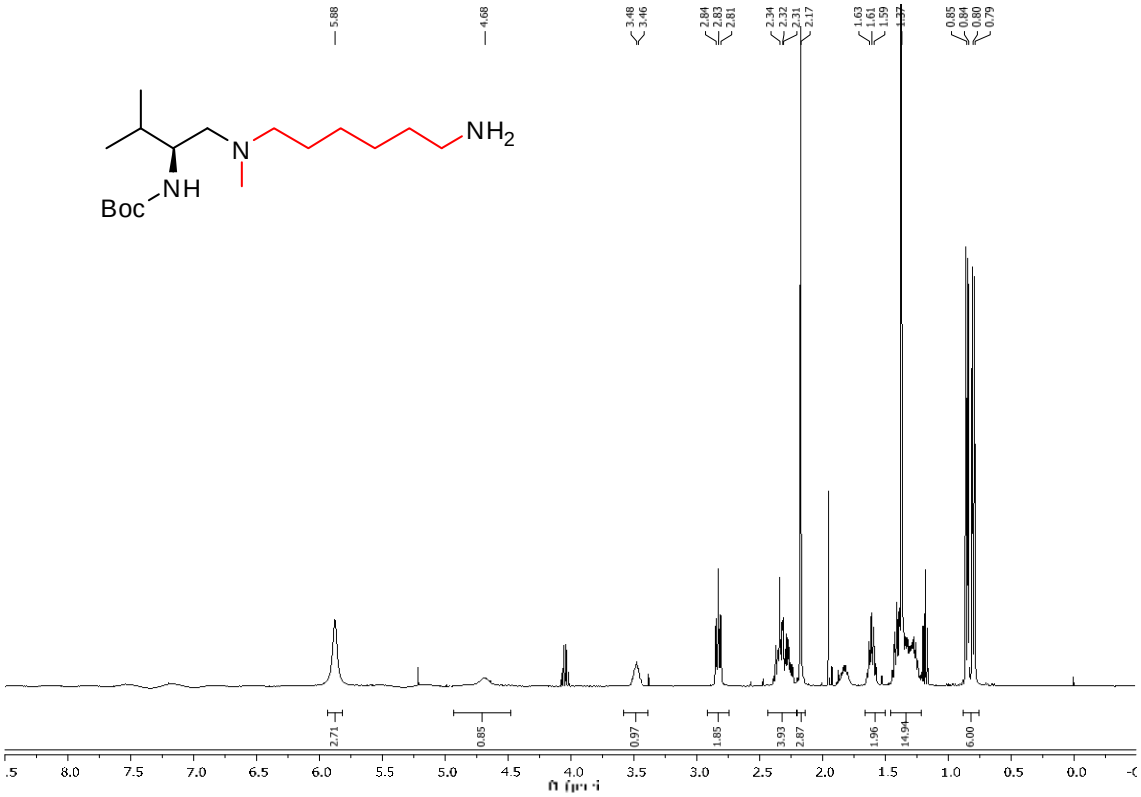


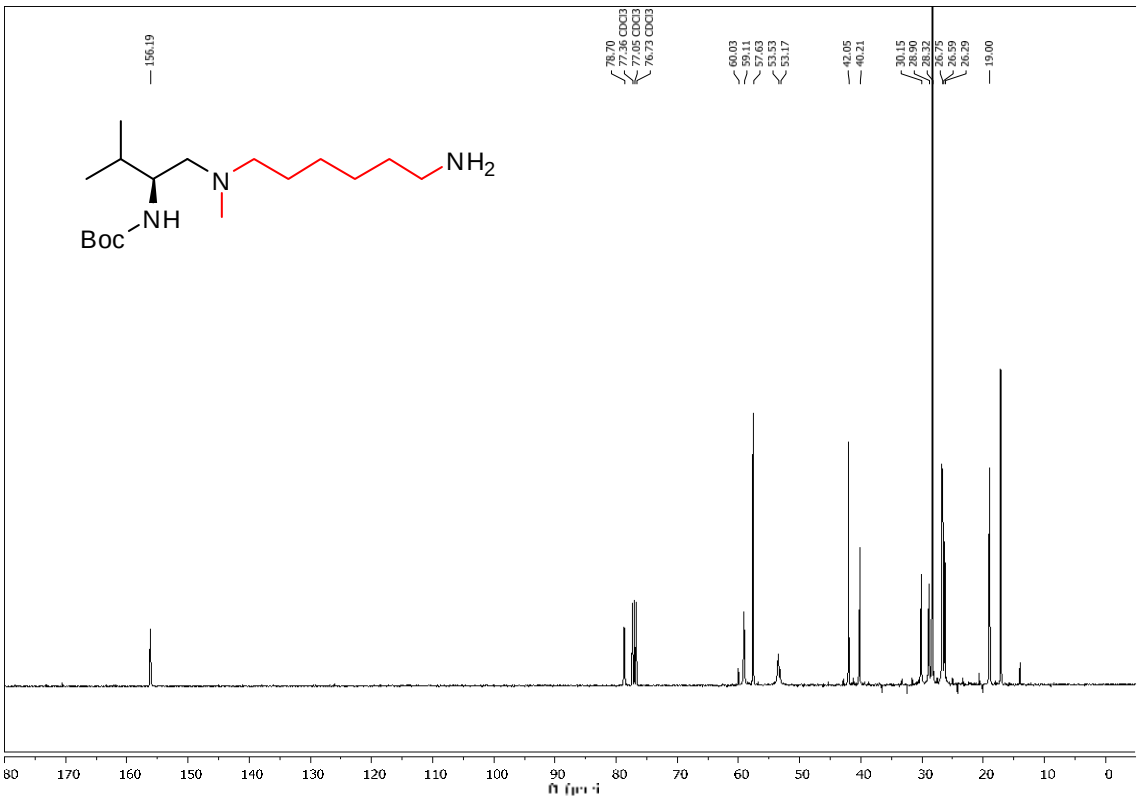
(S)-*tert*-Butyl 3-methyl-1-(methyl(2-(methylamino)ethyl)amino)butan-2-yl carbamate (12).



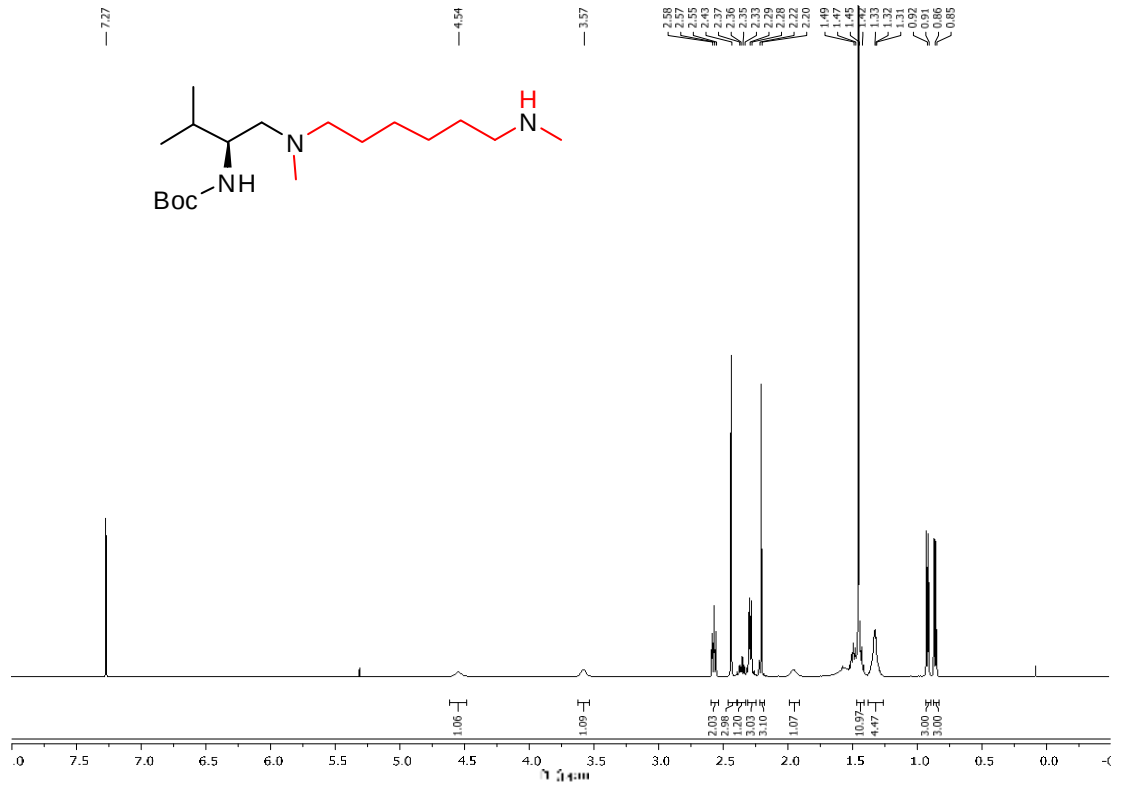


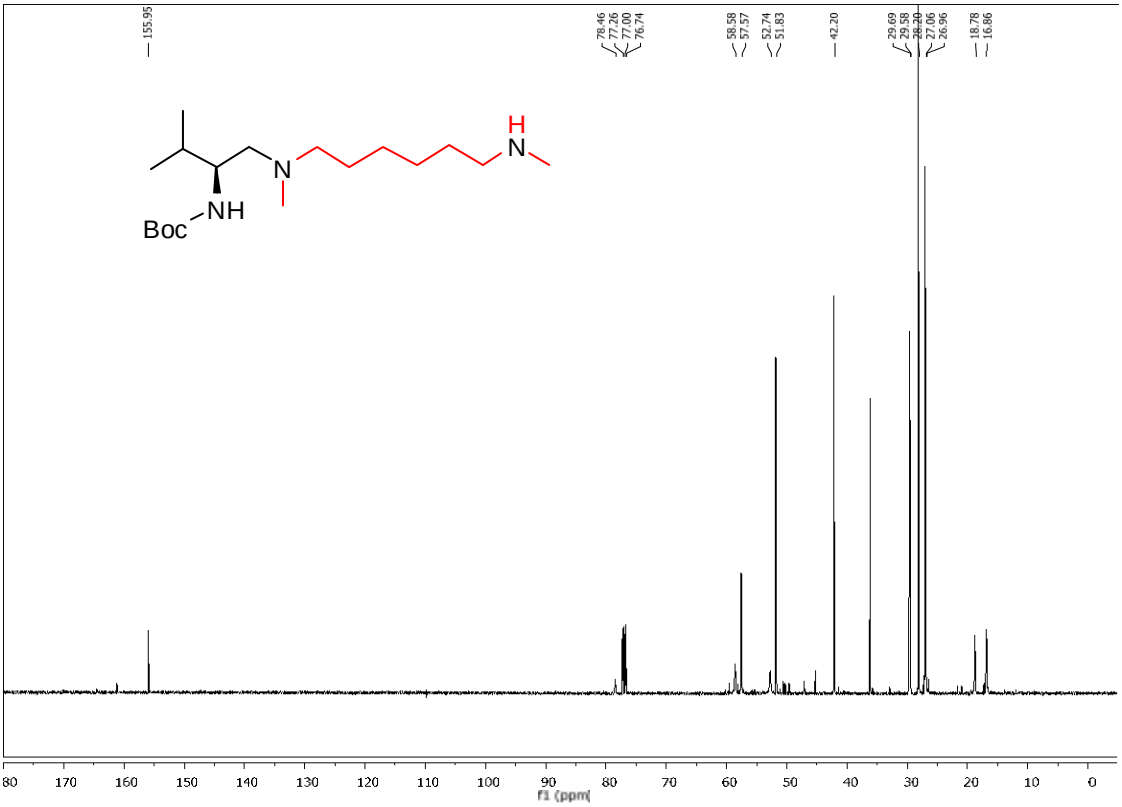
(S)-*tert*-Butyl (1-((6-aminohexyl)(methyl)amino)-3-methylbutan-2-yl)carbamate (13).



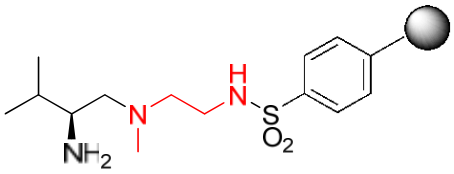


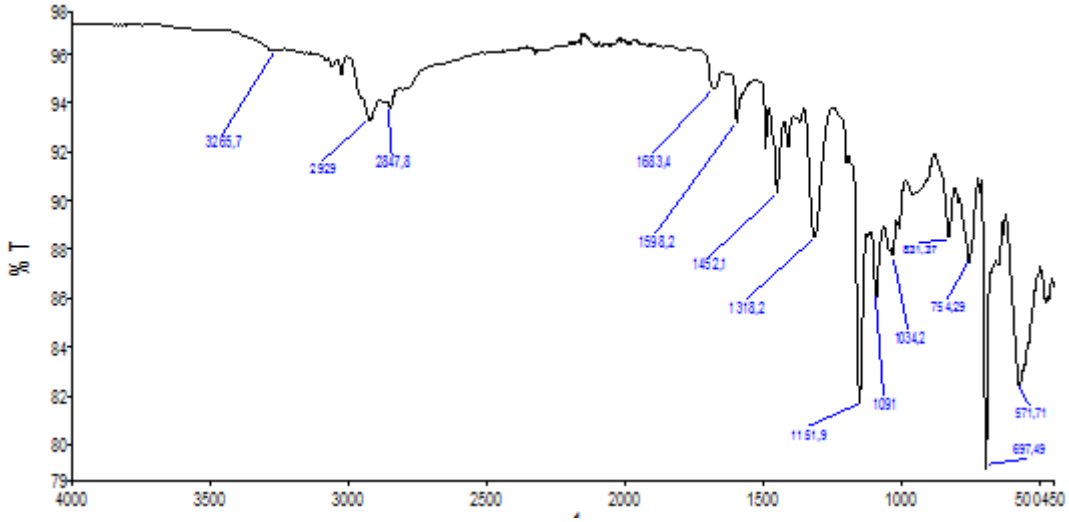
(*S*)-*tert*-Butyl (3-methyl-1-(methyl(6-(methylamino)hexyl)amino)butan-2-yl) carbamate (14).





Resin 15.





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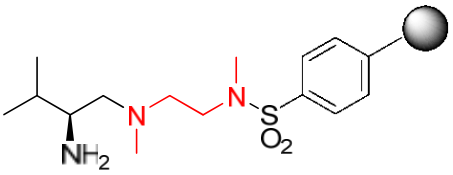

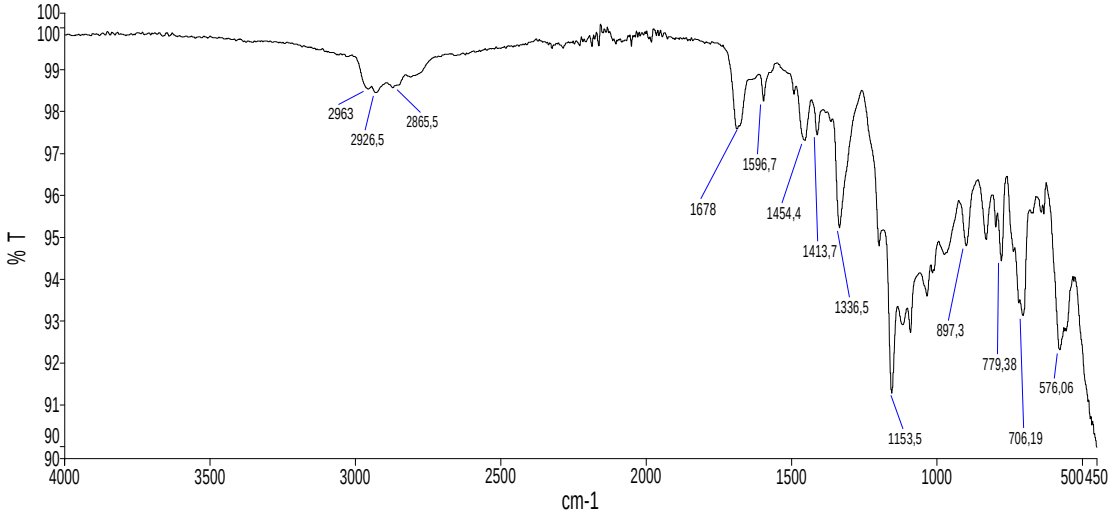

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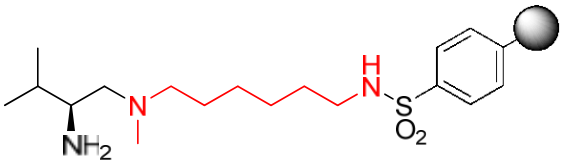

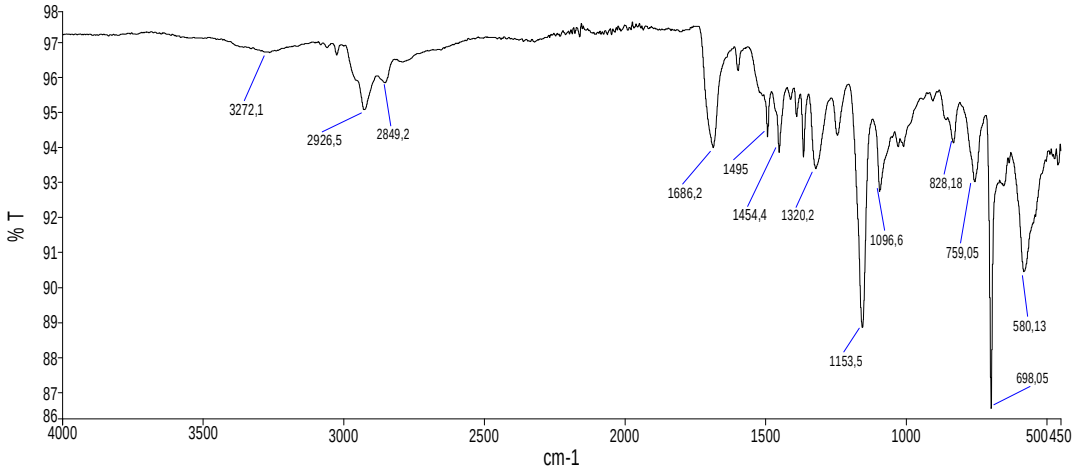

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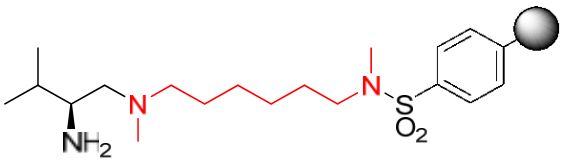

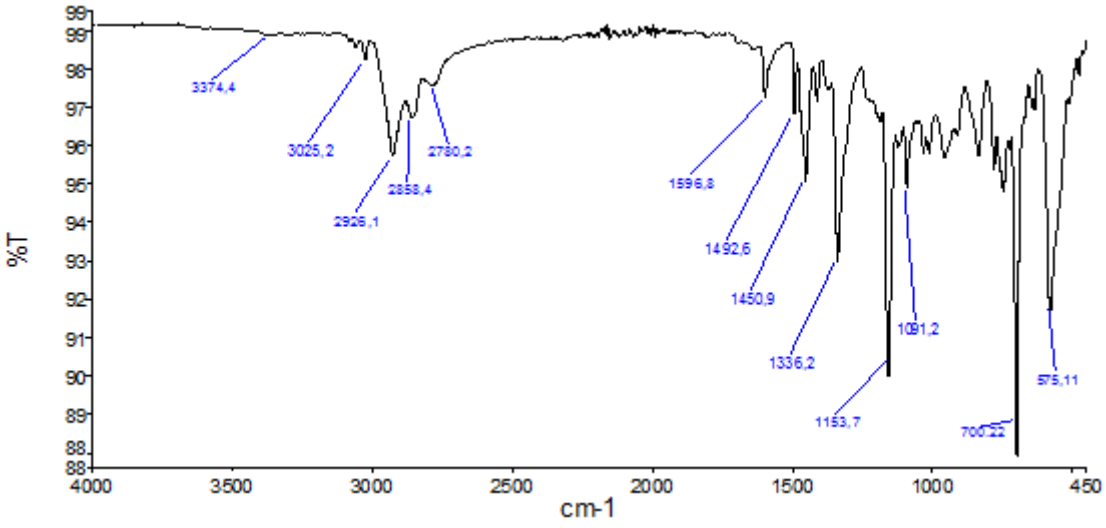

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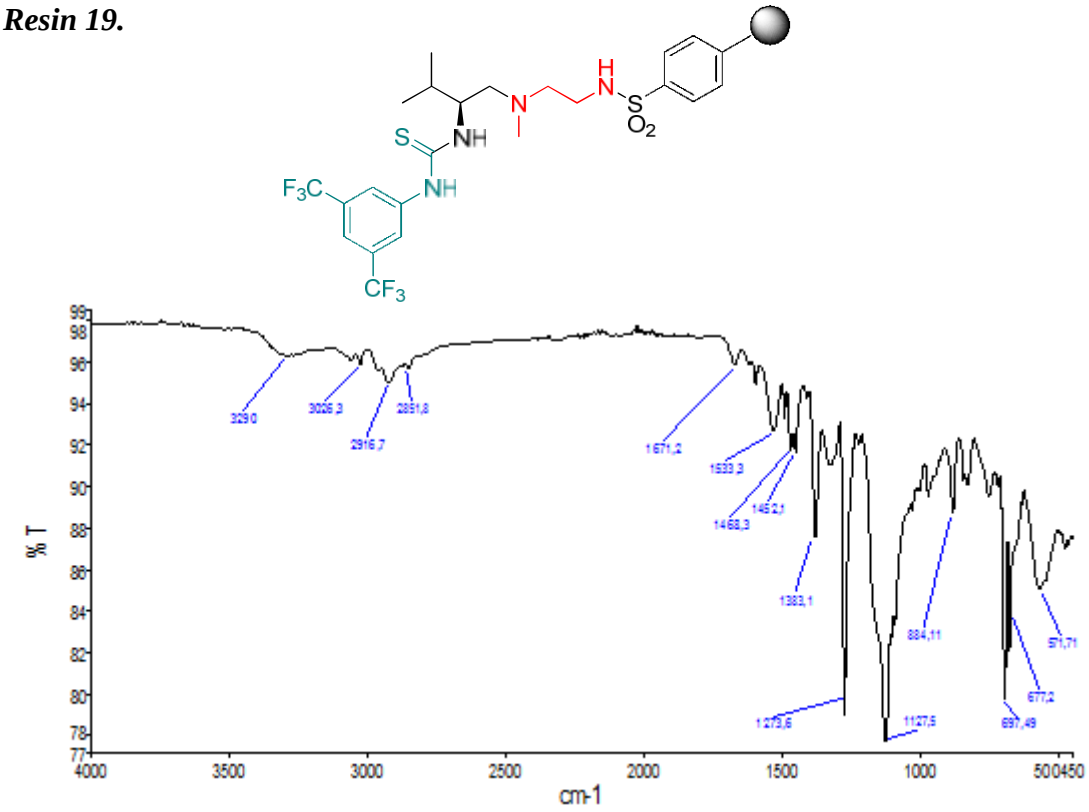

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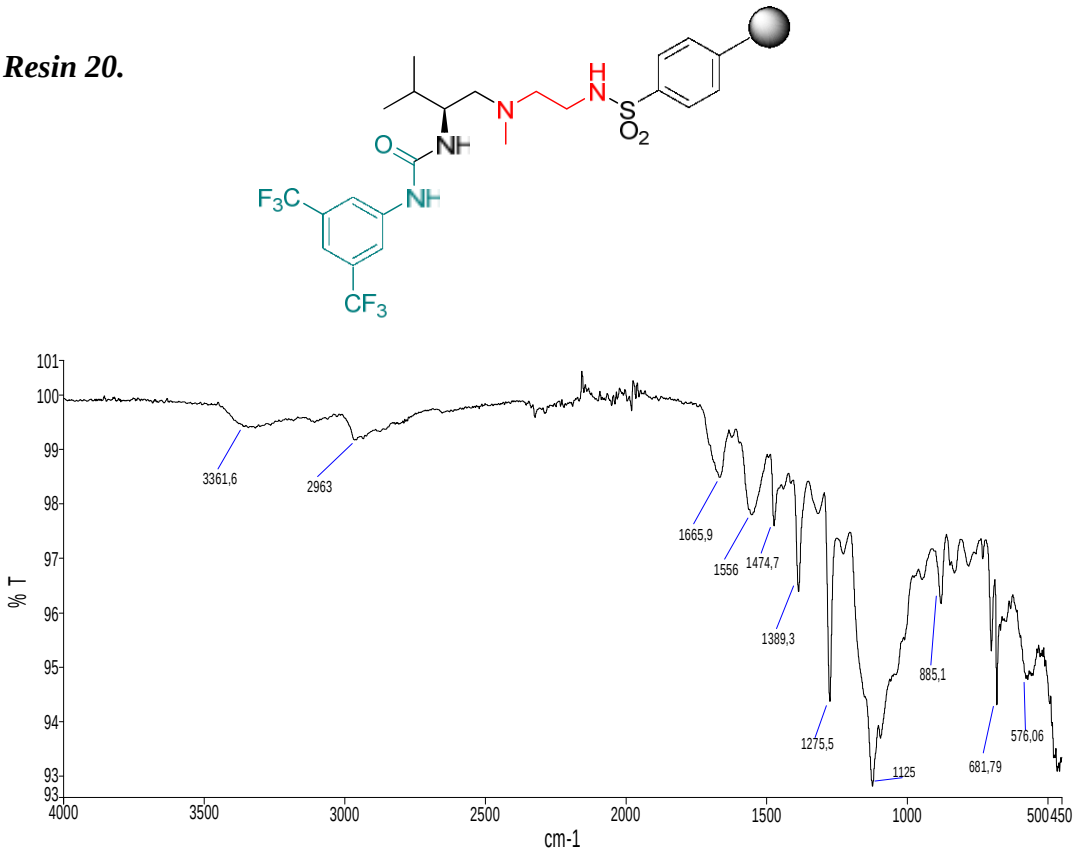

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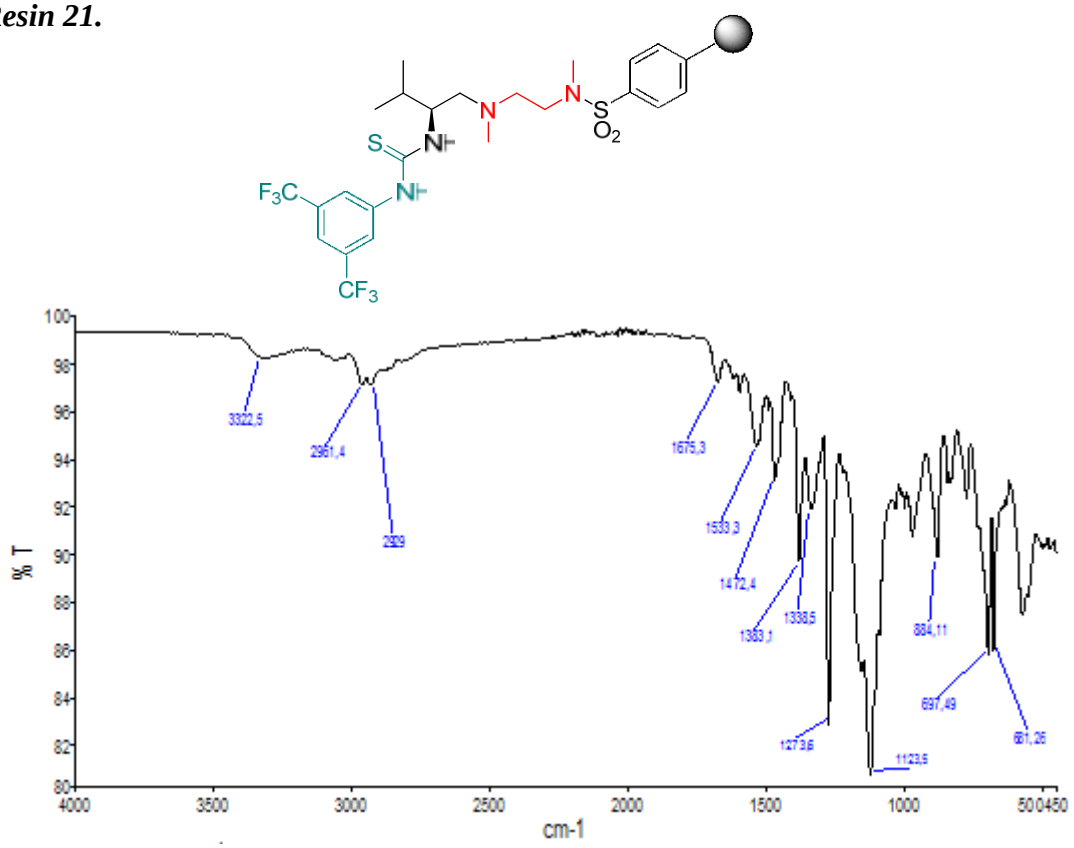

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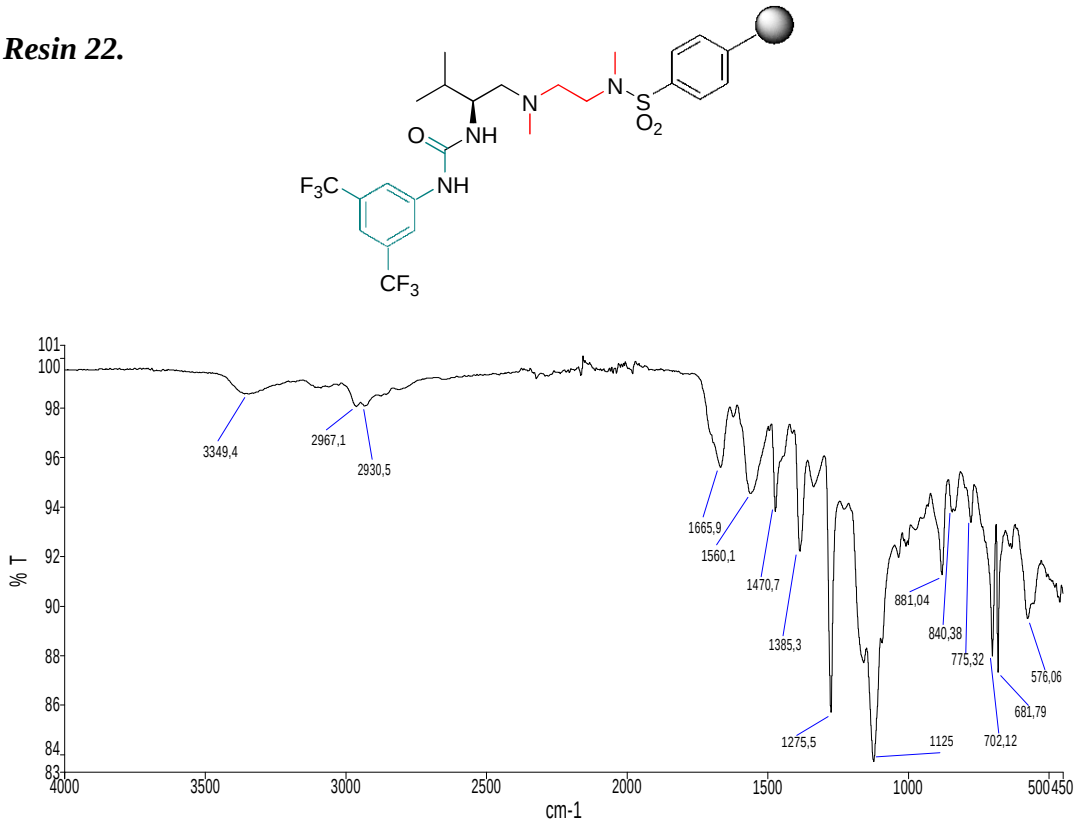

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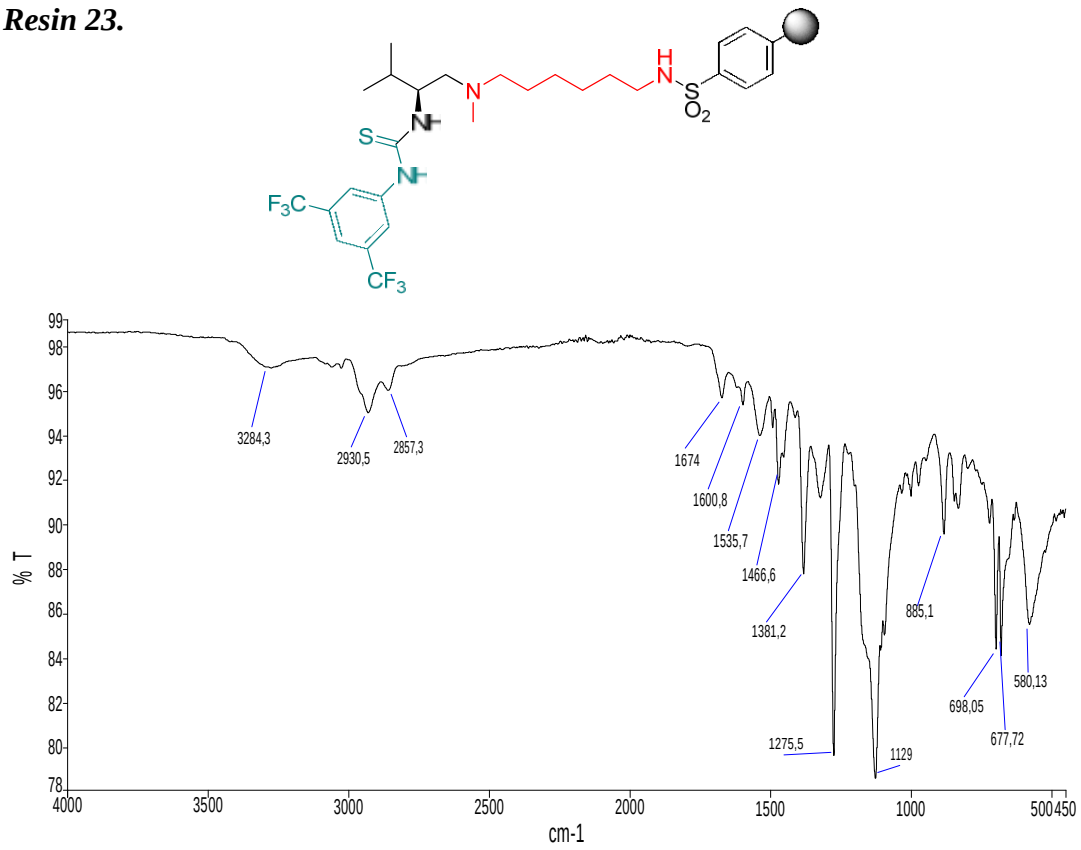

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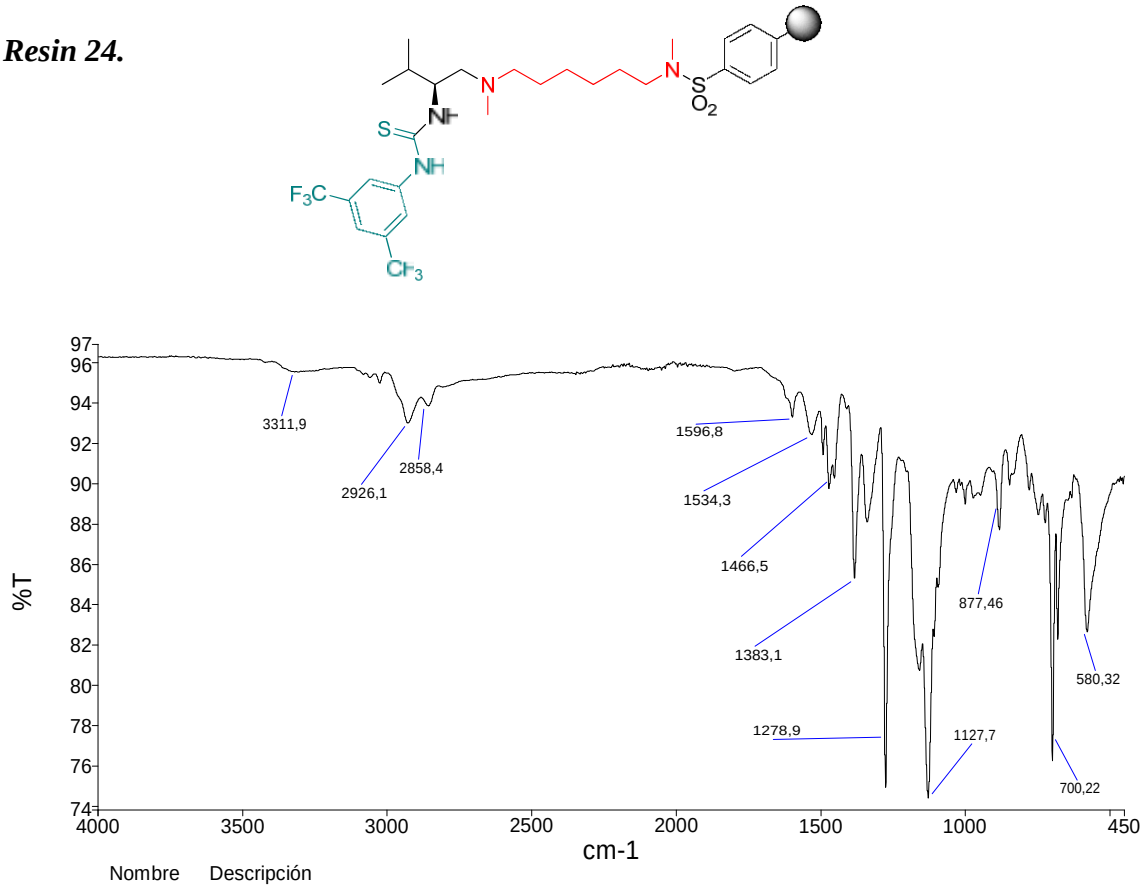
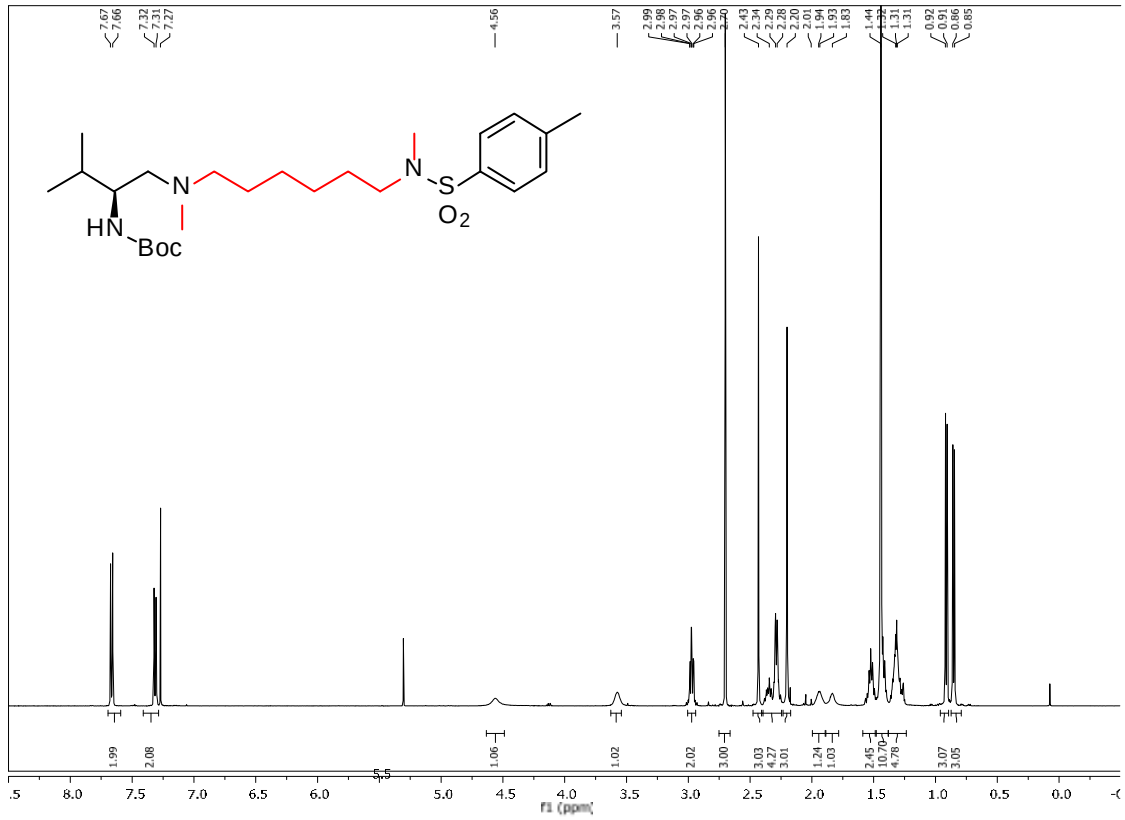
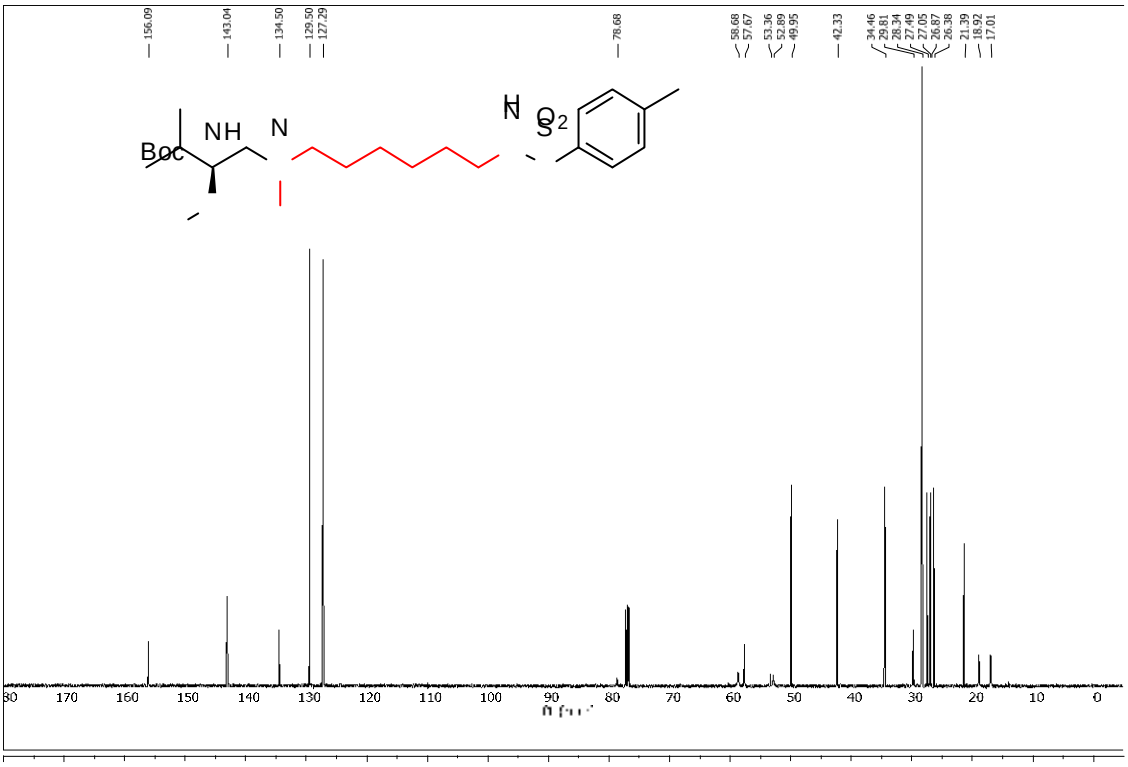


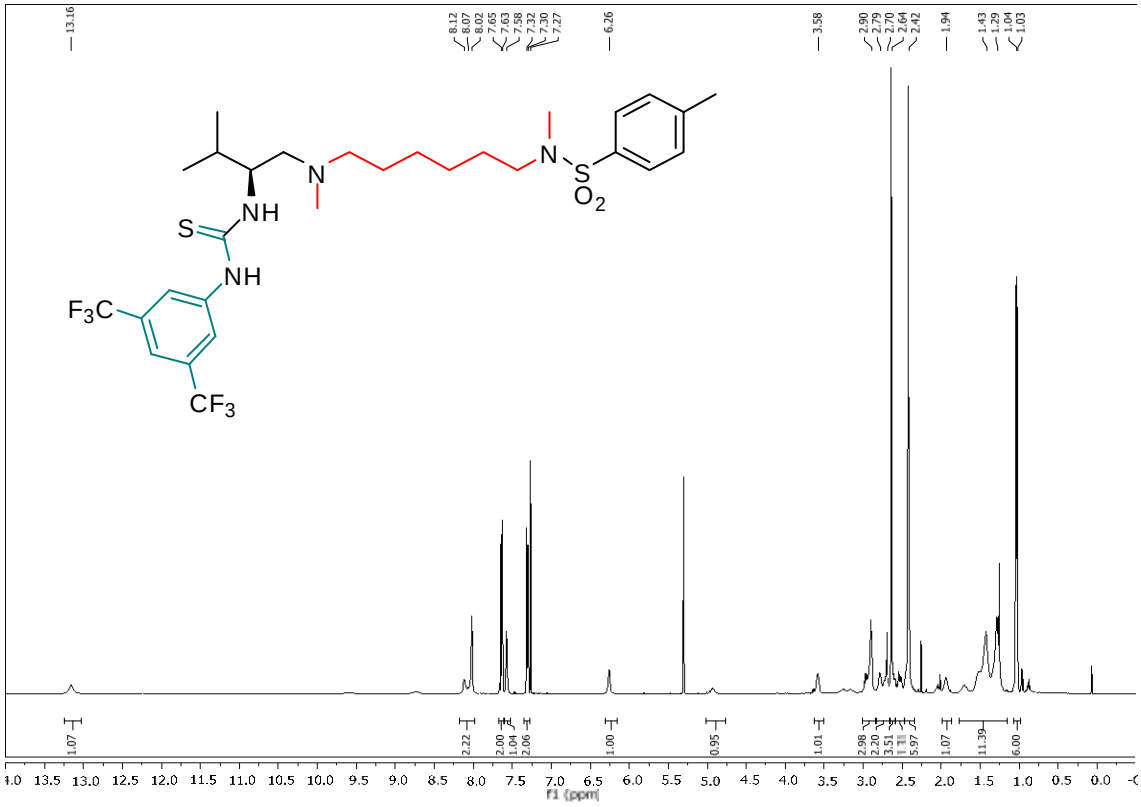
Nombre	Descripción
AC 10	solido blanco

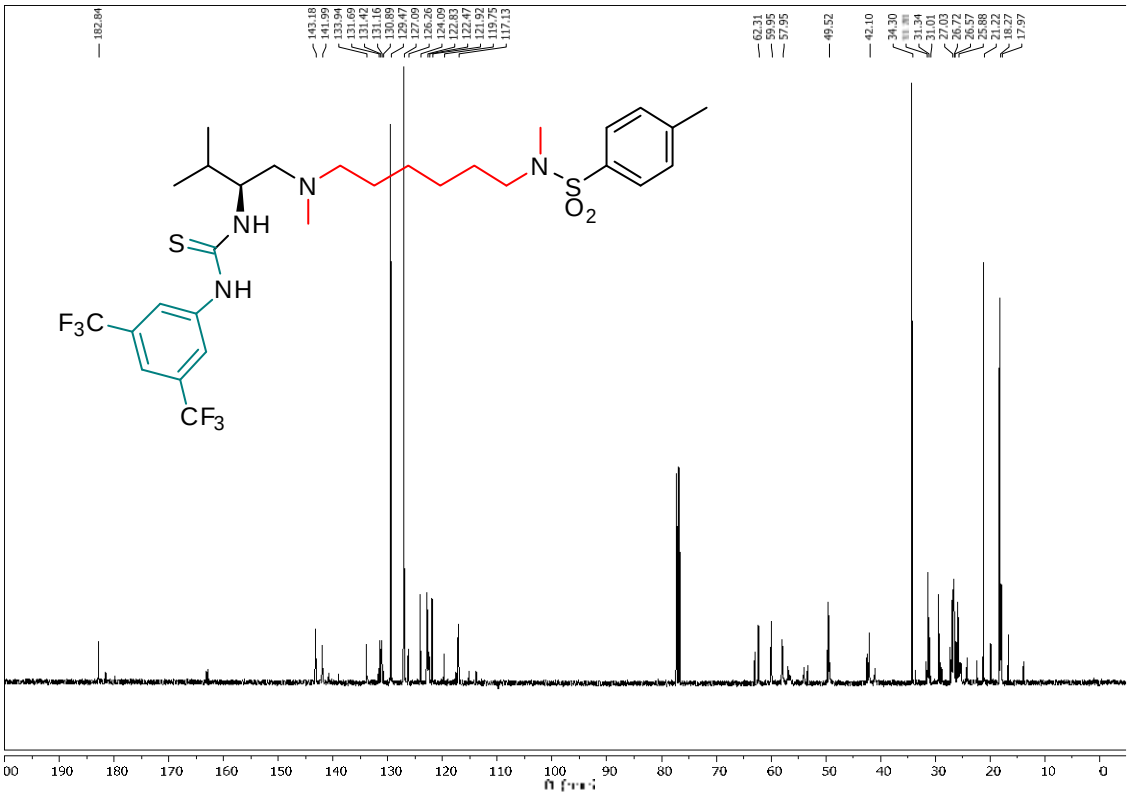
***(S)*-*tert*-Butyl 1-((6-(N,4-dimethylphenylsulfonamido)hexyl)(methyl)amino)-3-methylbutan-2-ylcarbamate (25).**





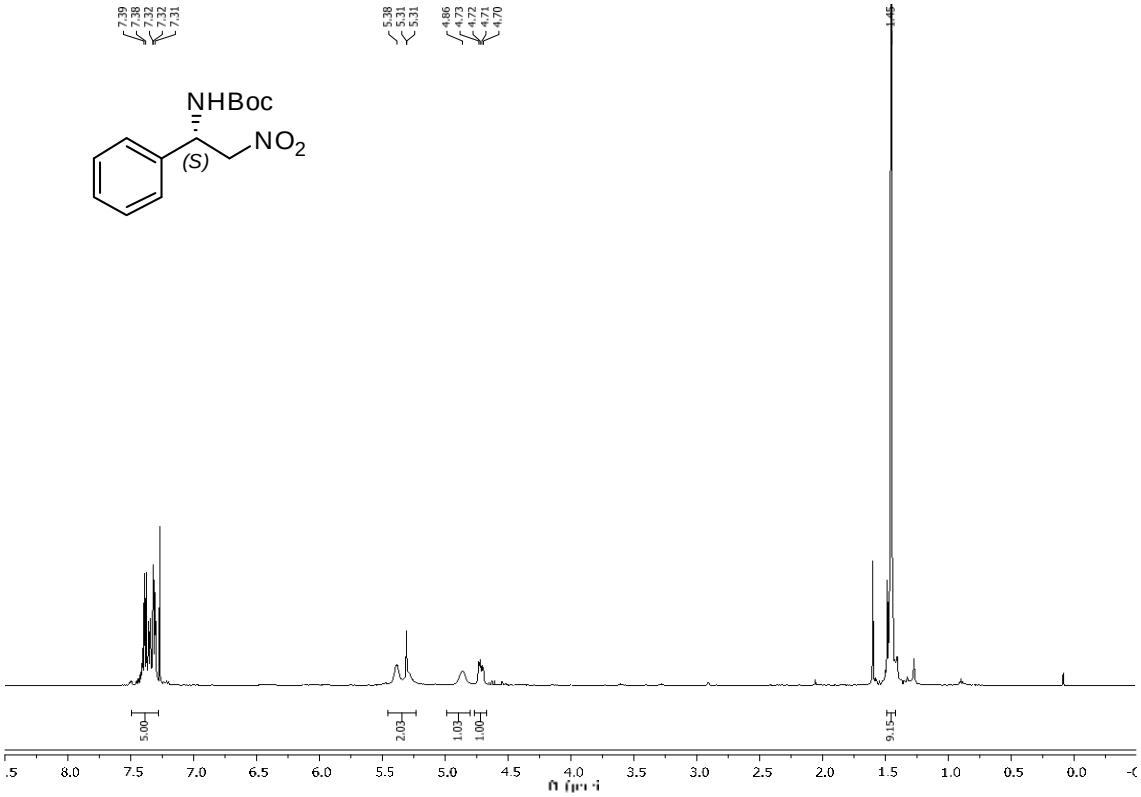
(S)-N-(6-((2-(3-(3,5-Bis(trifluoromethyl)phenyl)thioureido)-3-methylbutyl)(methyl) amino)hexyl)-N,4-dimethylbenzenesulfonamide (26).



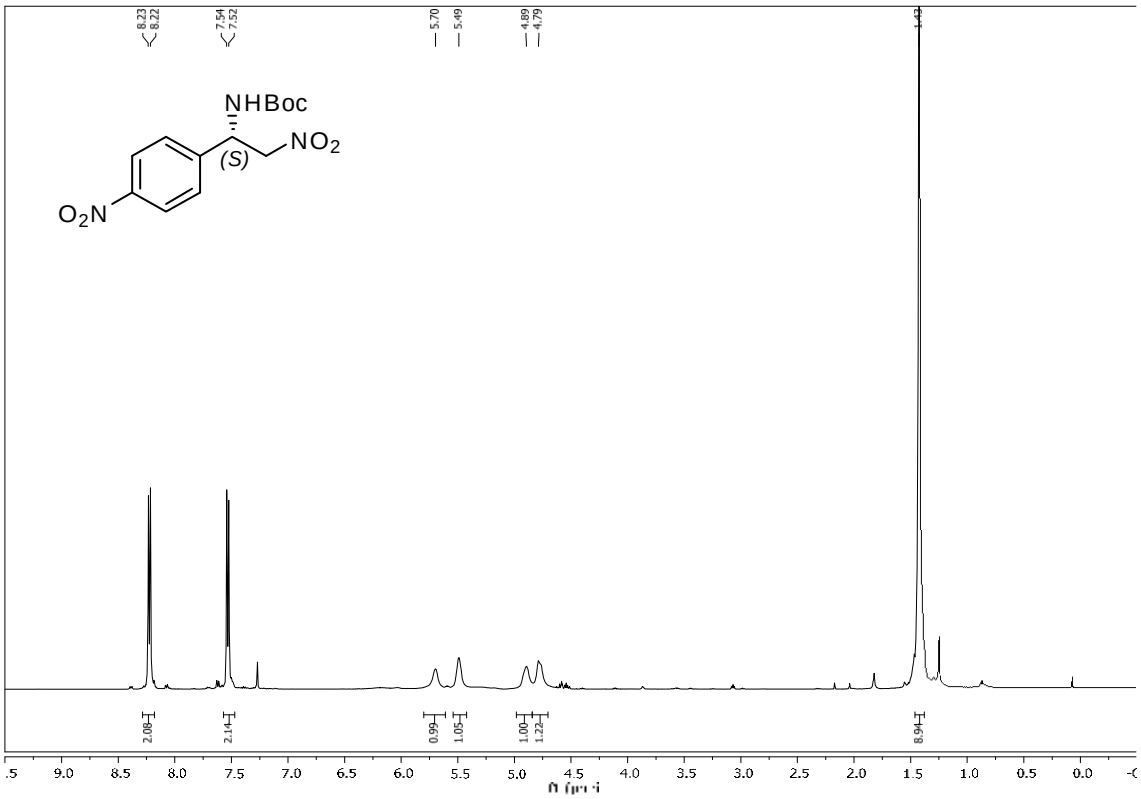


3. NMR Spectra for Aza-Henry reaction products.

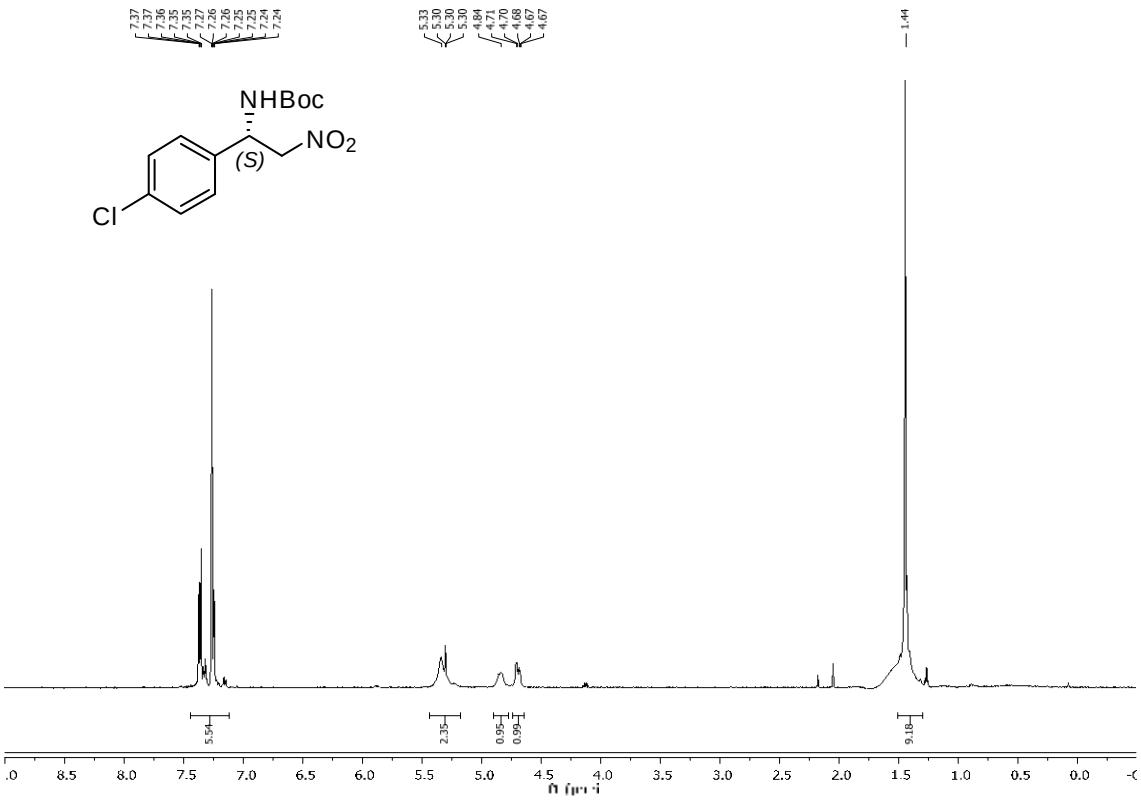
tert-Butyl (*S*)-(1-phenyl) 2-nitroethylcarbamate (30a).



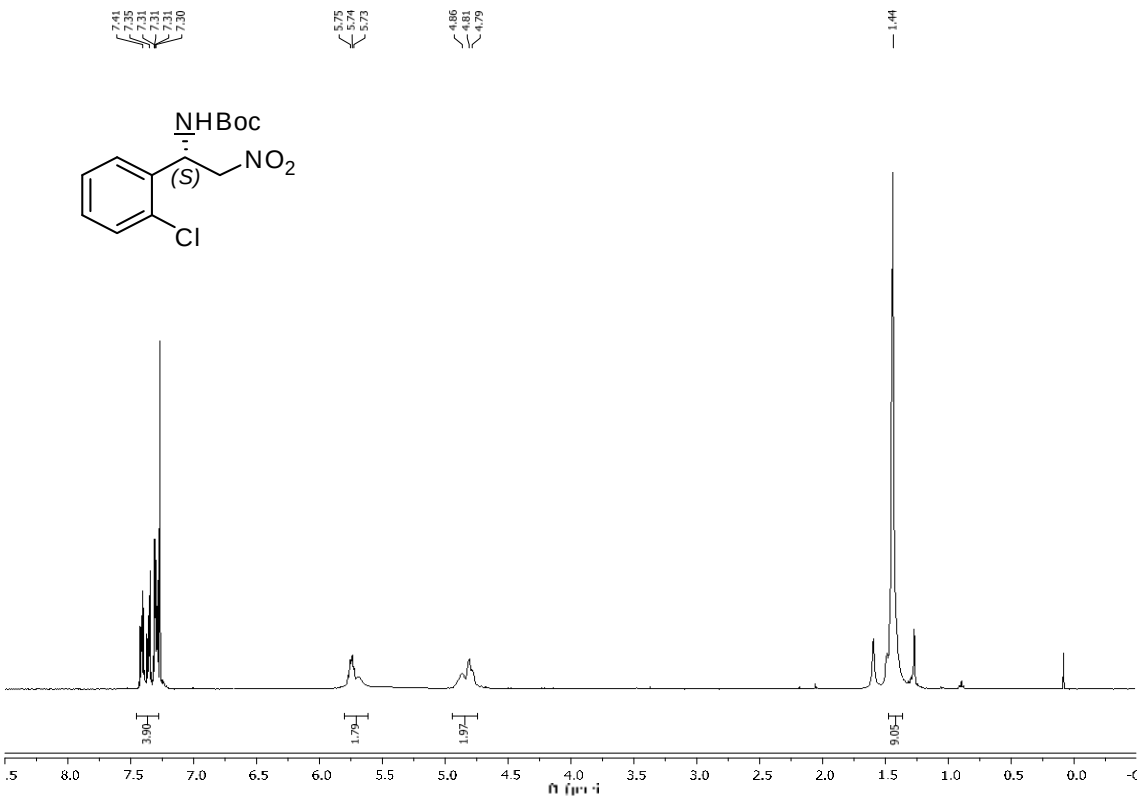
tert-Butyl (*S*)-1-(4-nitrophenyl)-2-nitroethylcarbamate (30b).



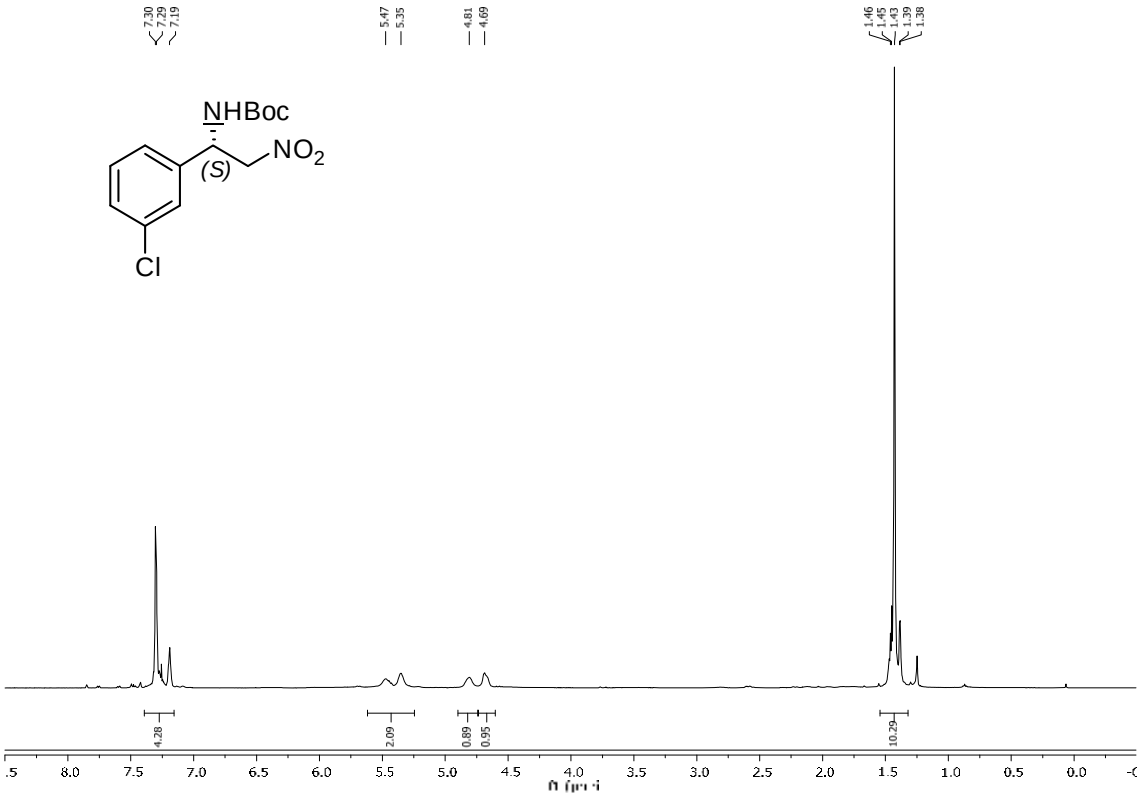
***tert*-Butyl (*S*)-1-(4chlorophenyl)-2-nitroethylcarbamate (30c).**



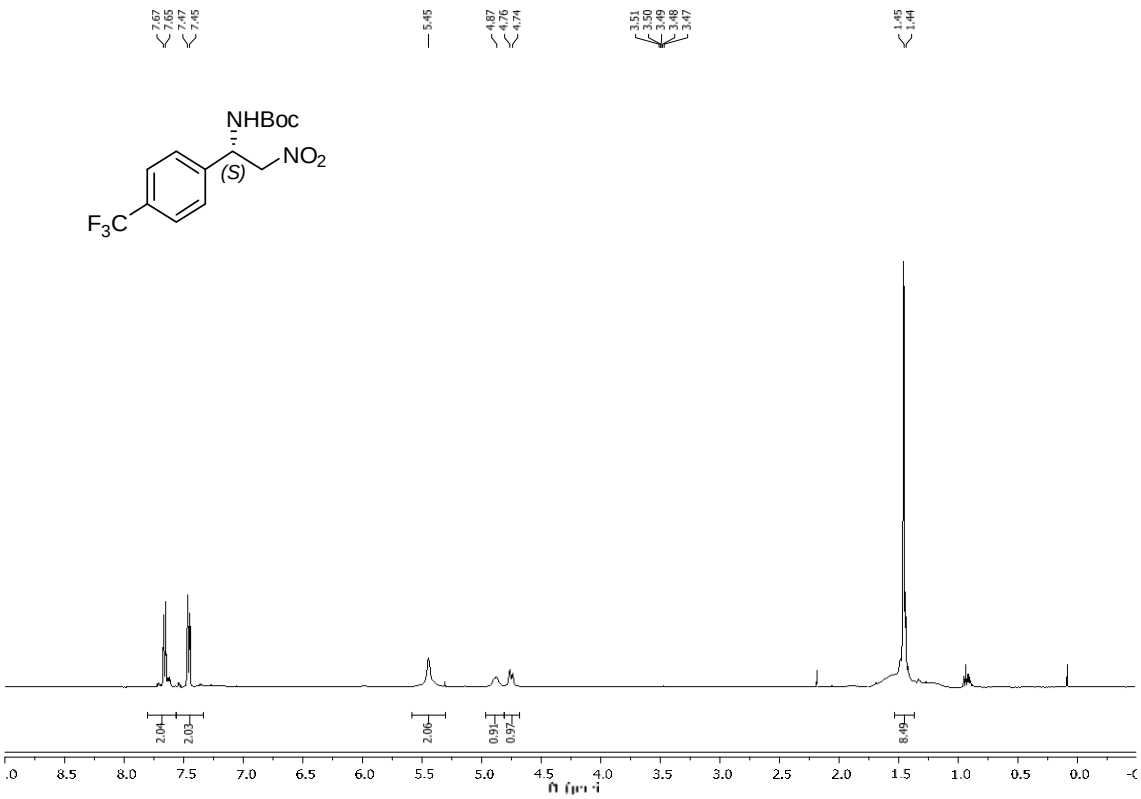
(S)-*tert*-Butyl-1-(2-chlorophenyl)-2-nitroethylcarbamate (30d).



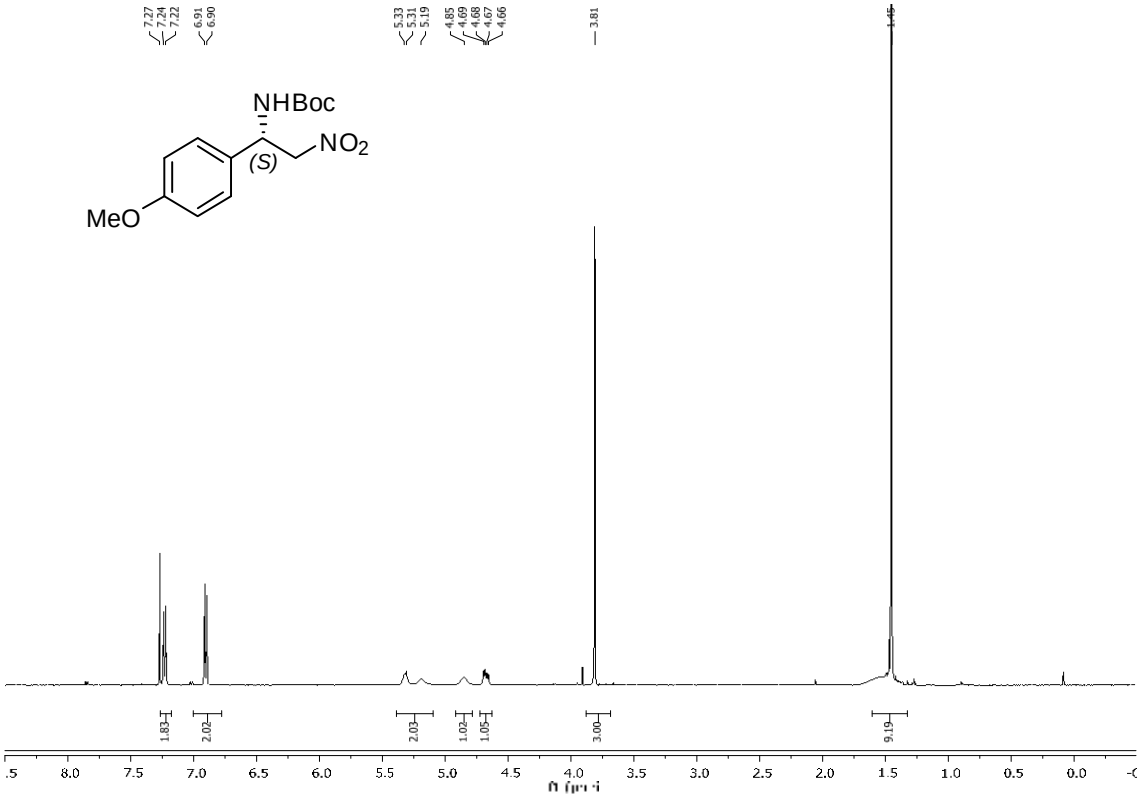
***tert*-Butyl (*S*)-1-(3-chlorophenyl)-2-nitroethylcarbamate (30e).**



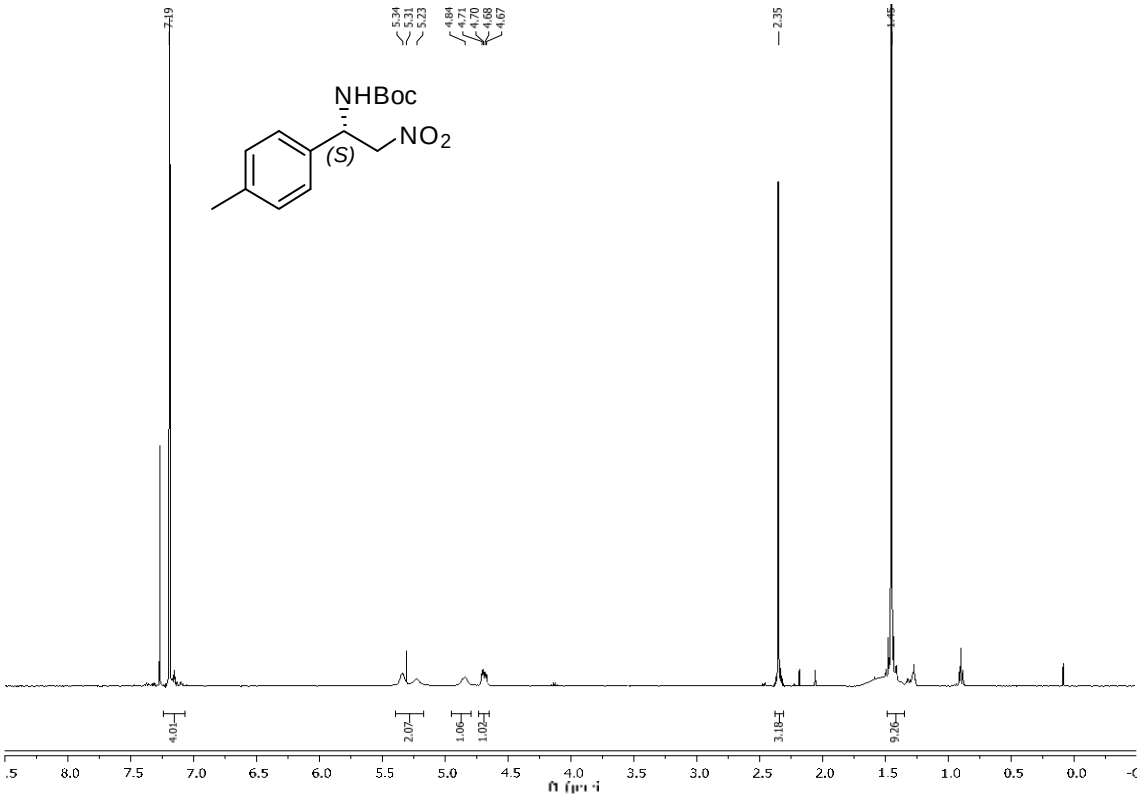
***tert*-Butyl (*S*)-1-(4-trifluoromethylphenyl)-2-nitroethylcarbamate (30f).**



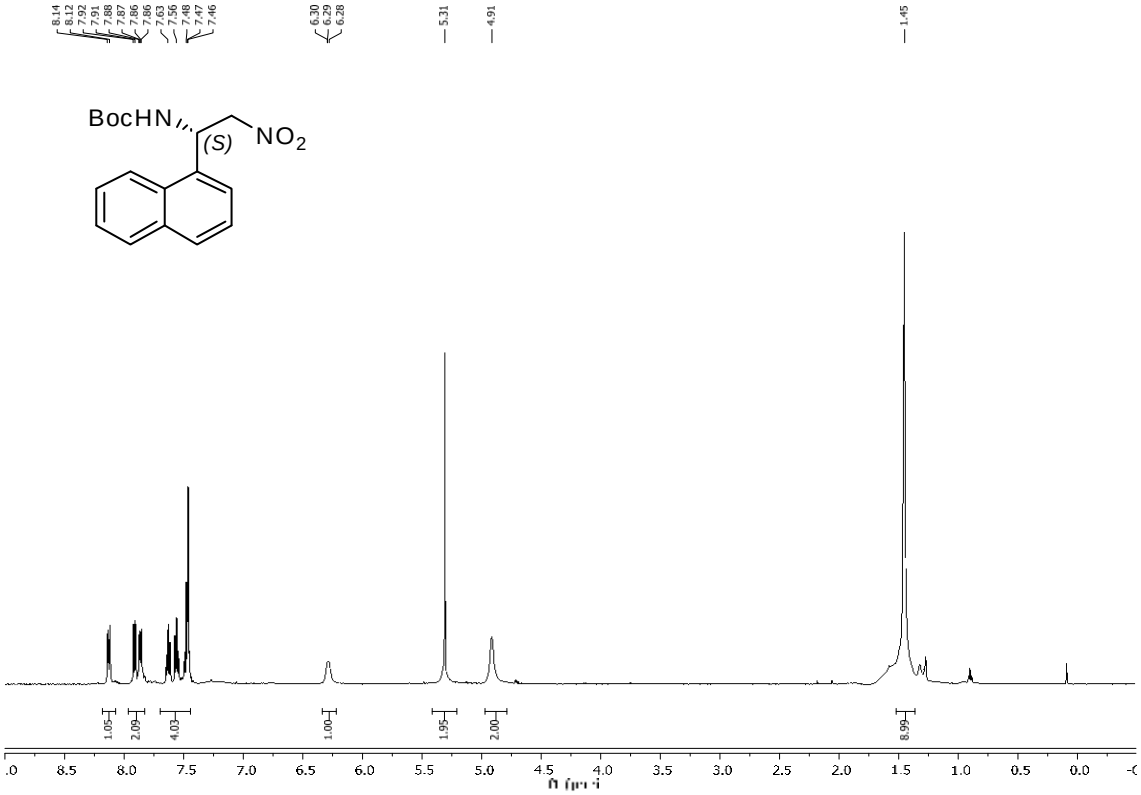
***tert*-Butyl (*S*)-1-(4-methoxyphenyl)-2-nitroethylcarbamate (30g).**



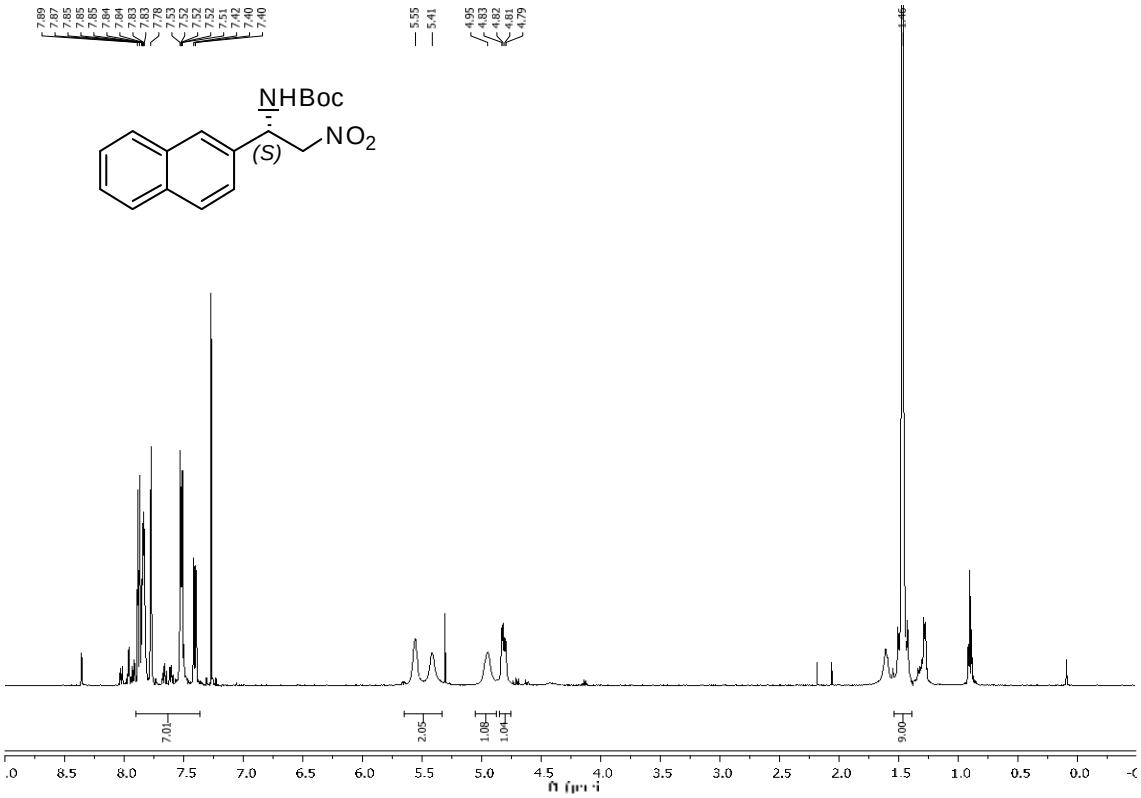
***tert*-Butyl (*S*)-1-(p-tolyl)-2-nitroethylcarbamate (30h).**



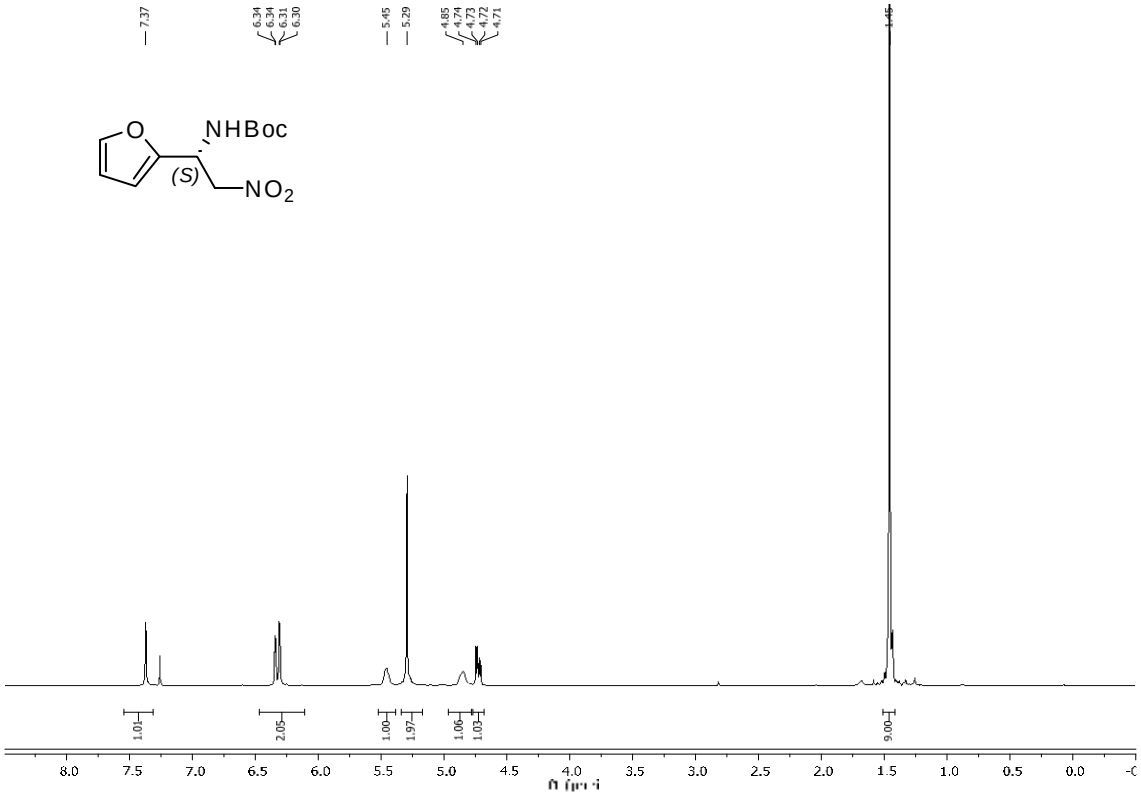
***tert*-Butyl (*S*)-1-(naphthalen-2-yl)-2-nitroethylcarbamate (30i).**



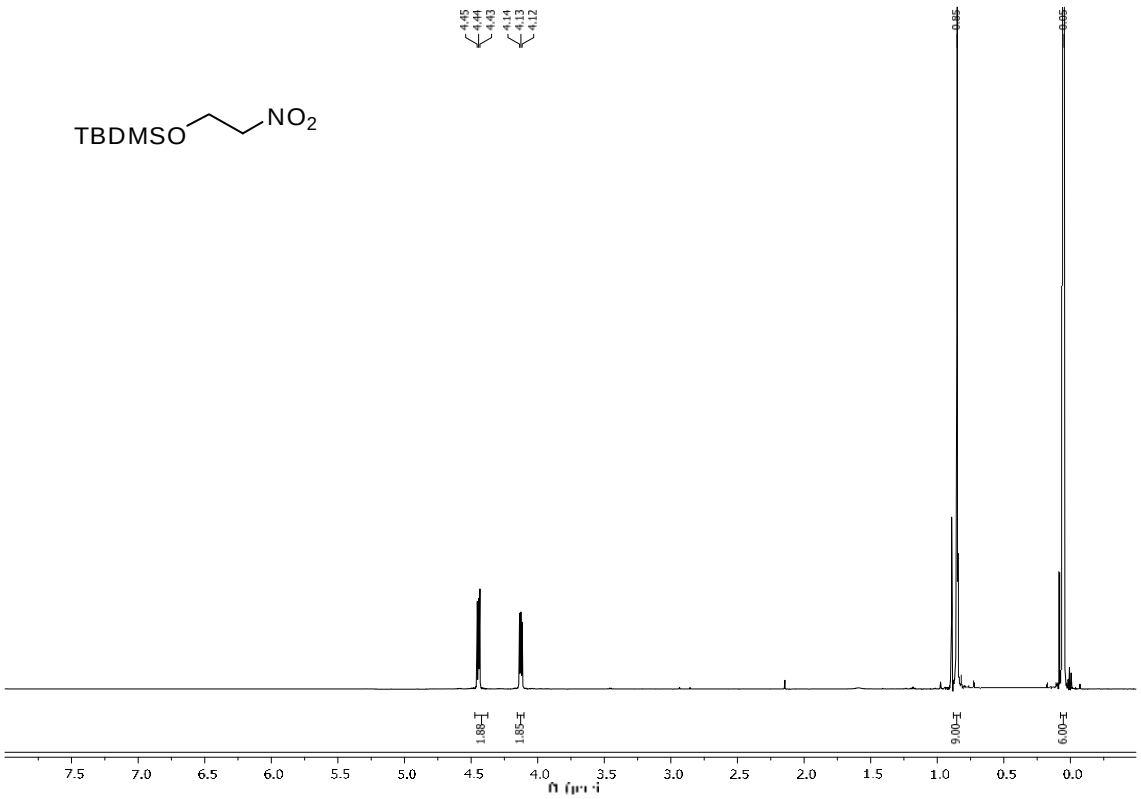
***tert*-Butyl (*S*)-1-(naphthalene-1-yl)-2-nitroethylcarbamate (30j).**



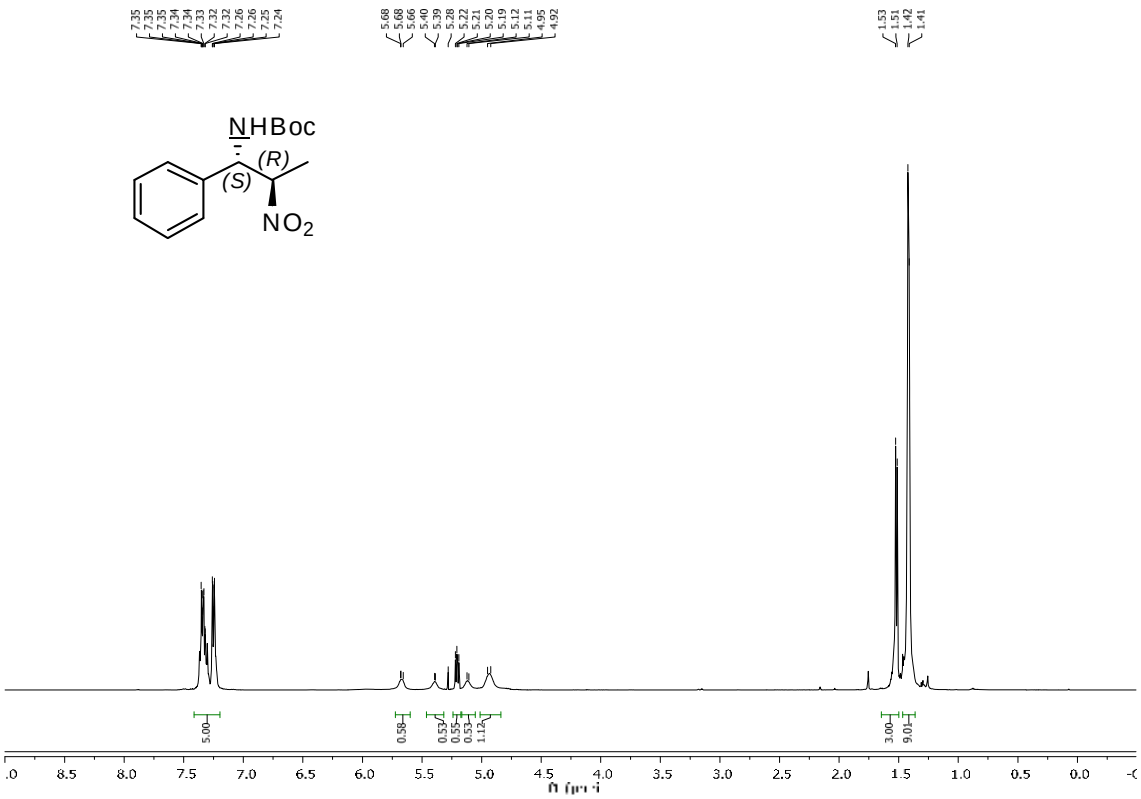
(*S*)-*tert*-Butyl 1-(furan-2-yl)-2-nitroethylcarbamate (30k).



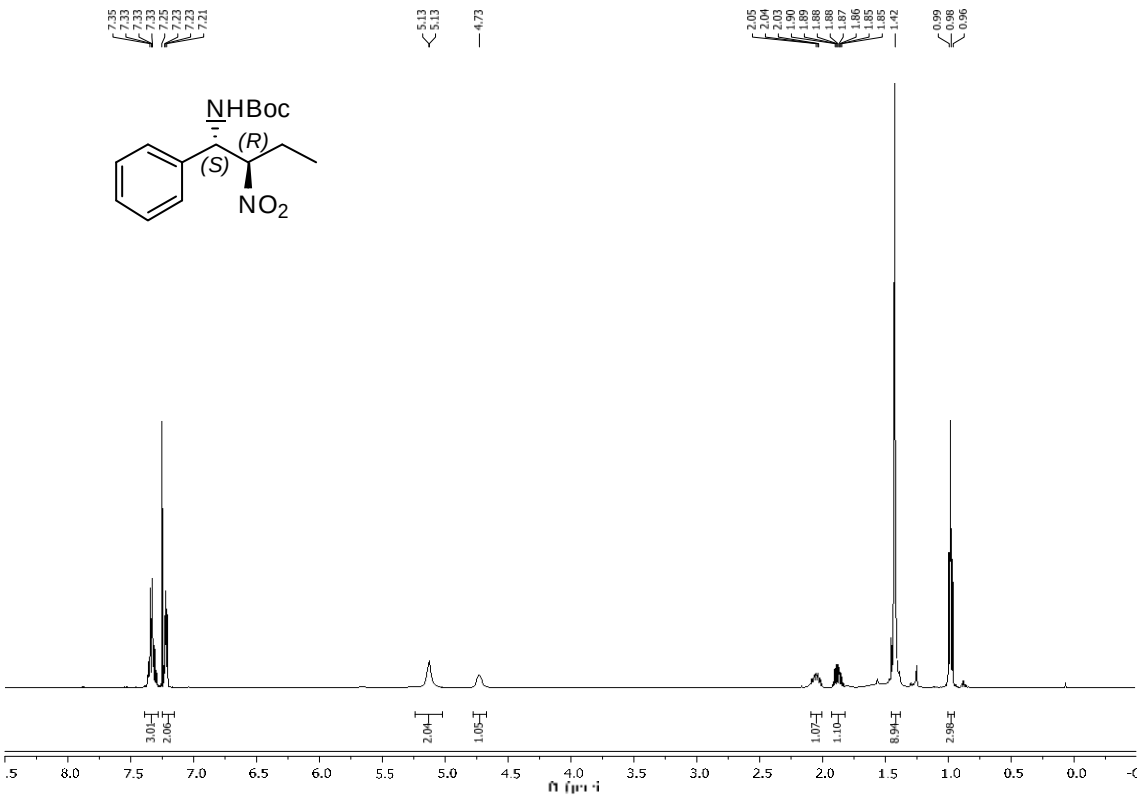
***tert*-Butyldimethyl(2-nitroethoxy)silane (31c).**



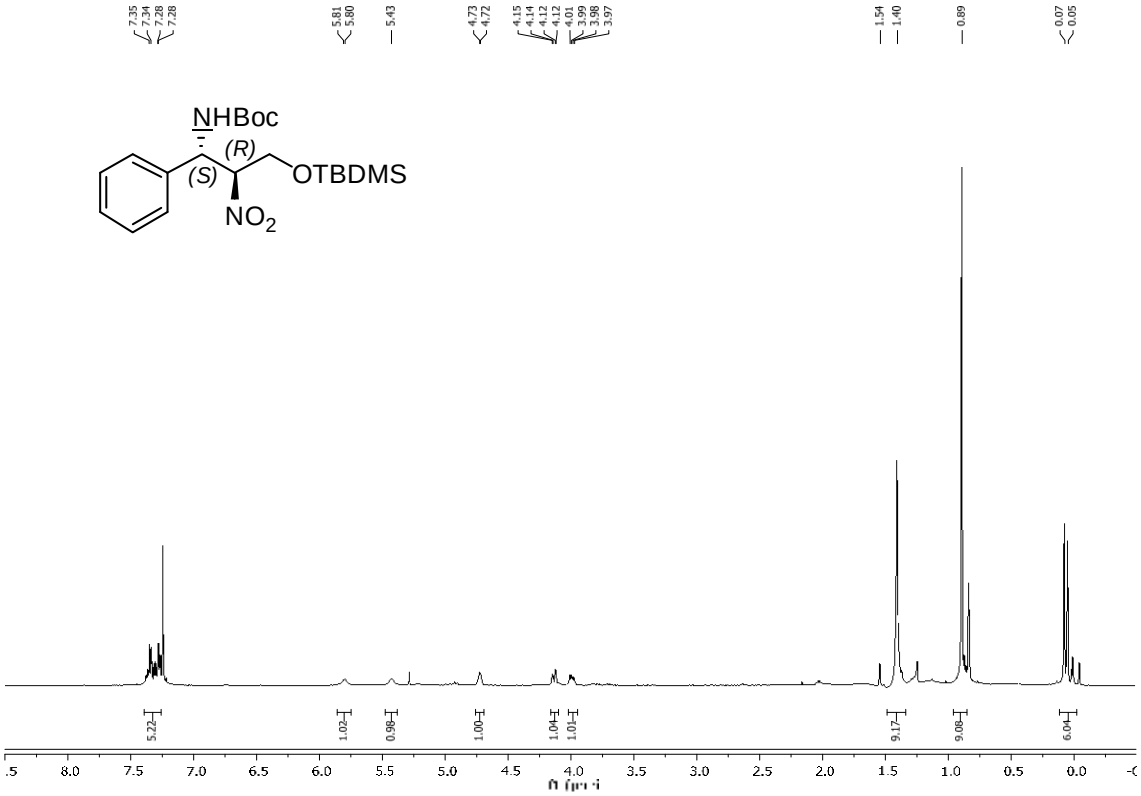
***tert*-Butyl [(1*R*, 2*S*)-2-nitro-1-phenylpropyl]carbamate (32aa).**



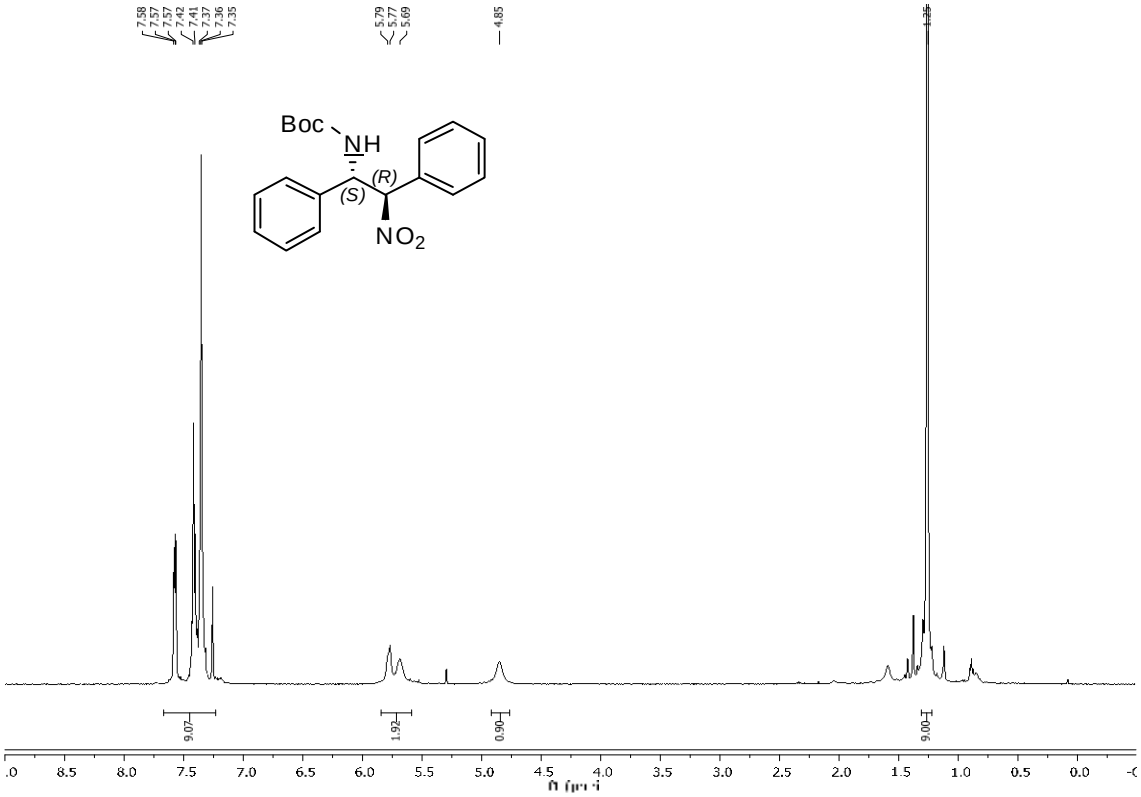
***tert*-Butyl [(1*R*, 2*S*)-2-nitro-1-phenylbutyl]carbamate (32ab).**



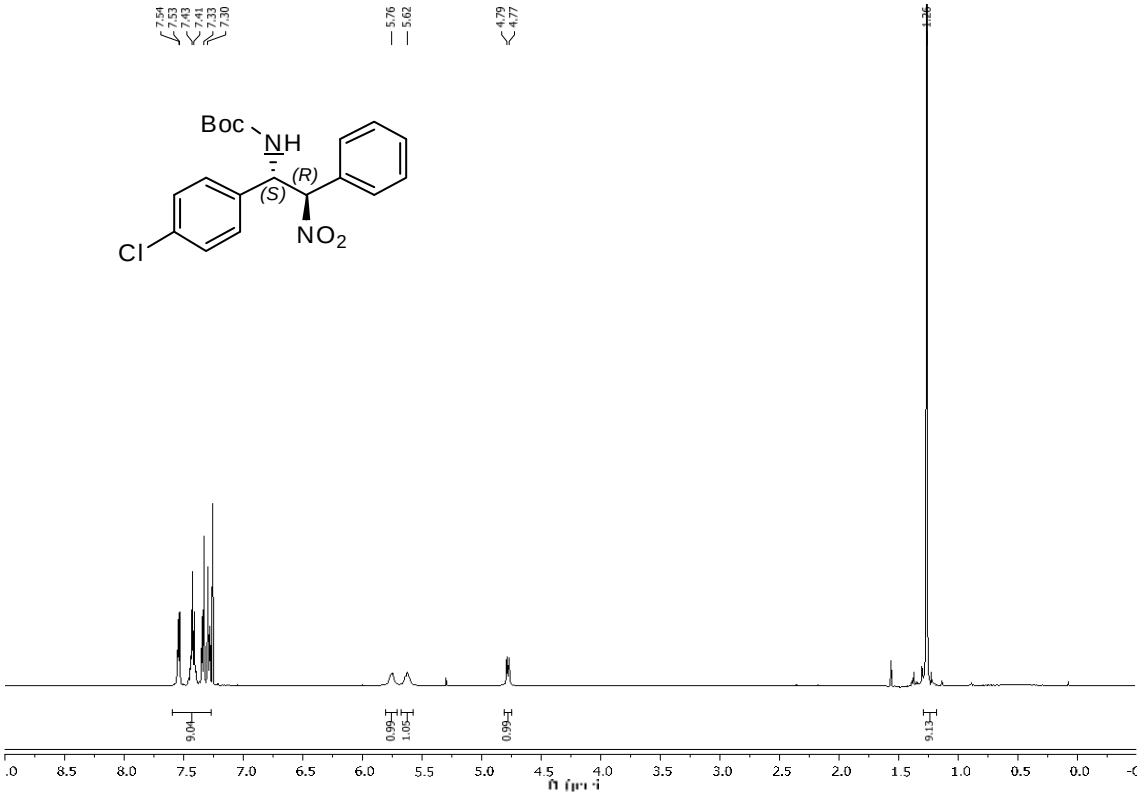
(1*S*,2*R*)-3-(*tert*-Butyldimethylsilyloxy)-2-nitro-1-phenylpropyl carbamic acid t-butyl ester (32ac).



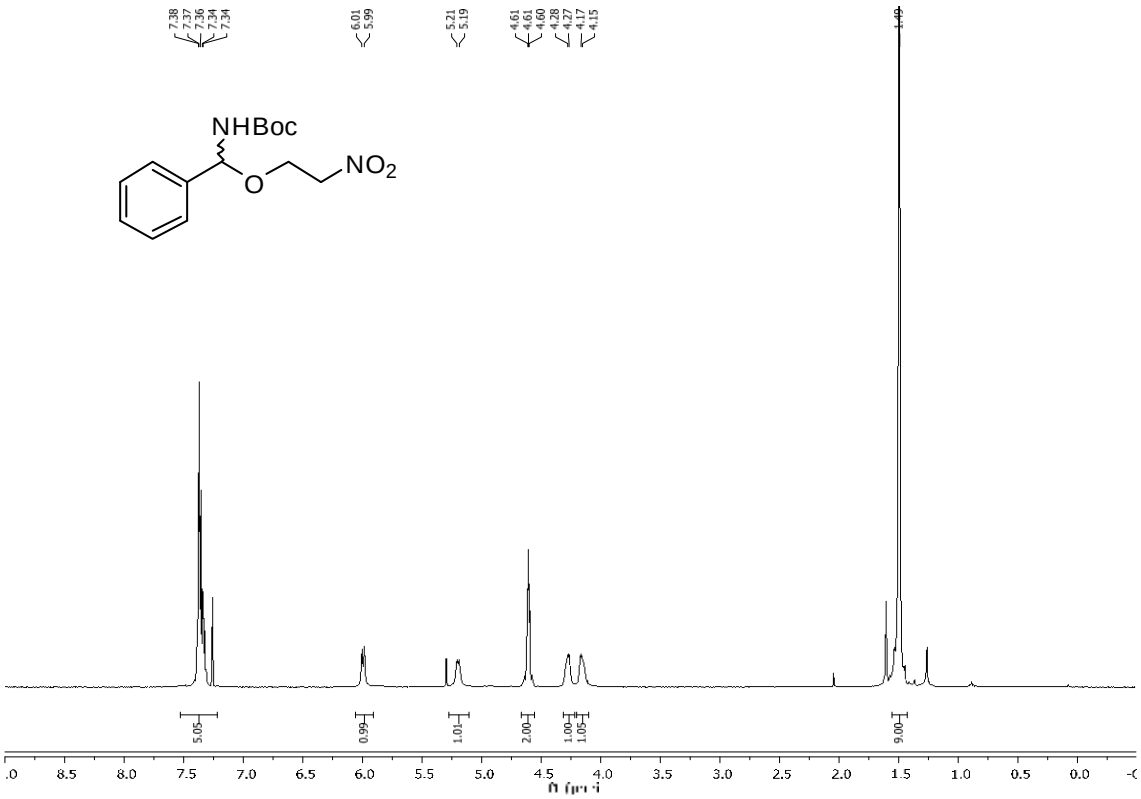
***tert*-Butyl (1*S*,2*R*)-2-nitro-1,2-diphenylethyl)carbamate (32ad).**



***tert*-Butyl (1*S*,2*R*)-1-(4-chlorophenyl)-2-nitro-2-phenylethylcarbamate (32cd).**

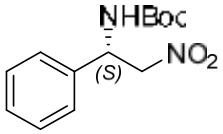


***tert*-Butyl ((2-nitroethoxy)(phenyl)methyl)carbamate (33).**

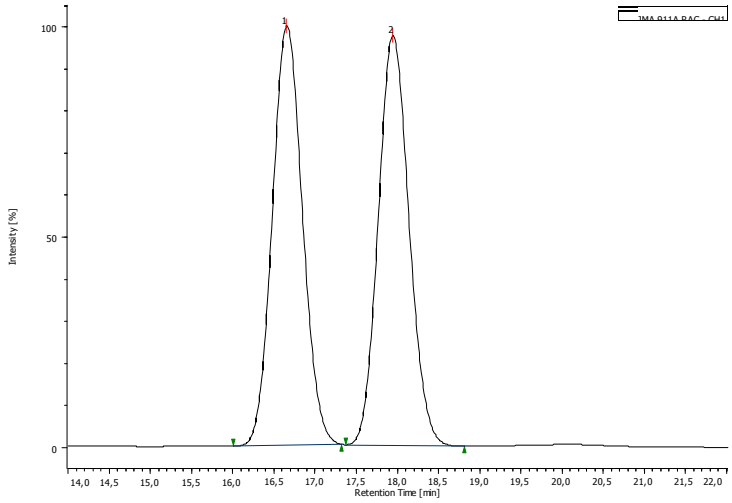


4. HPLC Profiles of the Aza-Henry products.

(*S*)-*tert*-Butyl 2-nitro-1-phenylethylcarbamate (30a).

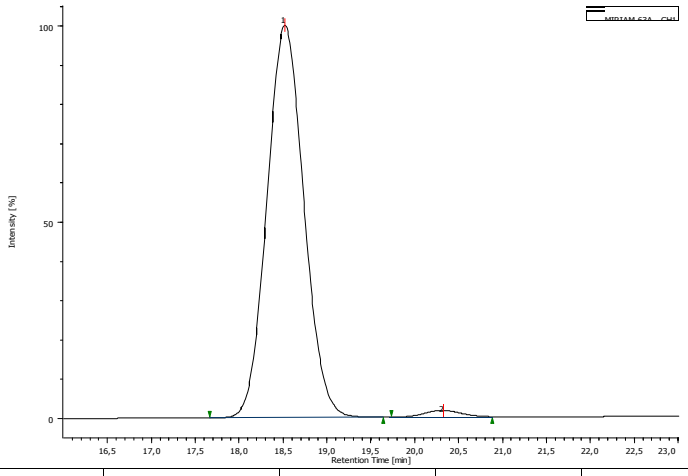


Racemic molecule:



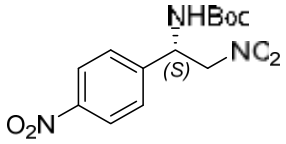
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	16,650	2086901	82103	50,067	50,569	1,089
2	17,942	2081327	80256	49,933	49,431	1,097

HPLC profile for entry 2, table 2. 98:2 er.

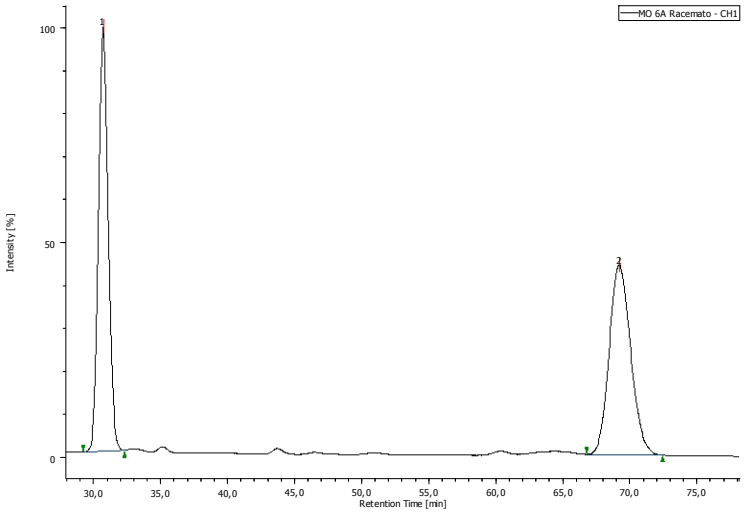


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	18,517	7282087	249819	98,383	98,341	1,075
2	20,317	119666	4215	1,617	1,659	1,029

(S)-*tert*-Butyl 2-nitro-1-(4-nitrophenyl)ethylcarbamate (30b).

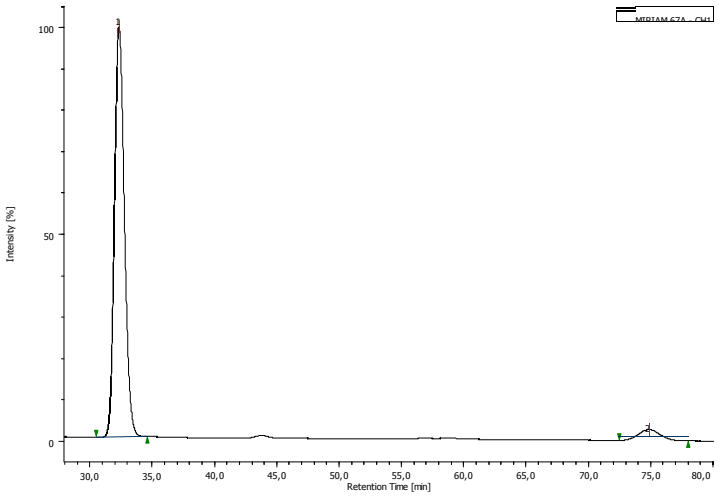


Racemic molecule:



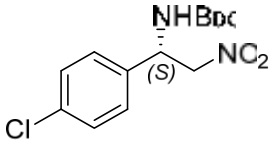
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	30,742	1404809	27599	50,541	69,083	1,095
2	69,242	1374724	12351	49,459	30,917	1,140

HPLC profile for entry 4, table 2. 95:5 er.

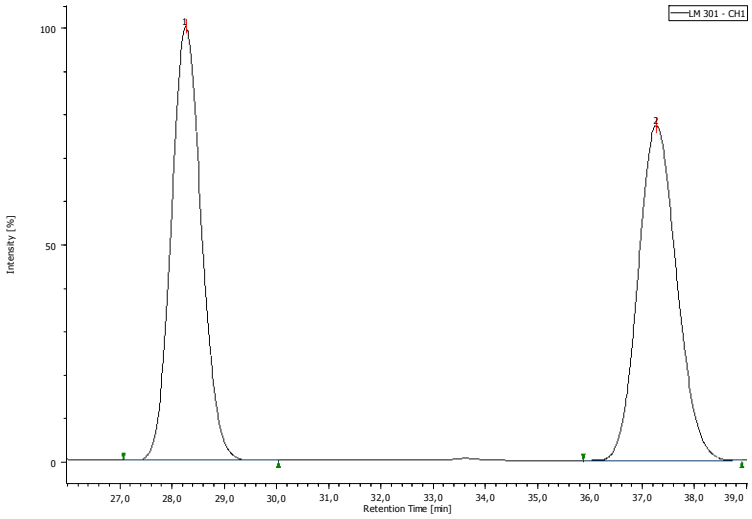


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	32,350	3398095	61747	94,602	97,366	1,165
2	74,800	201499	1670	5,398	2,634	1,082

(*S*)-*tert*-Butyl 1-(4chlorophenyl)-2-nitroethylcarbamate (30c).

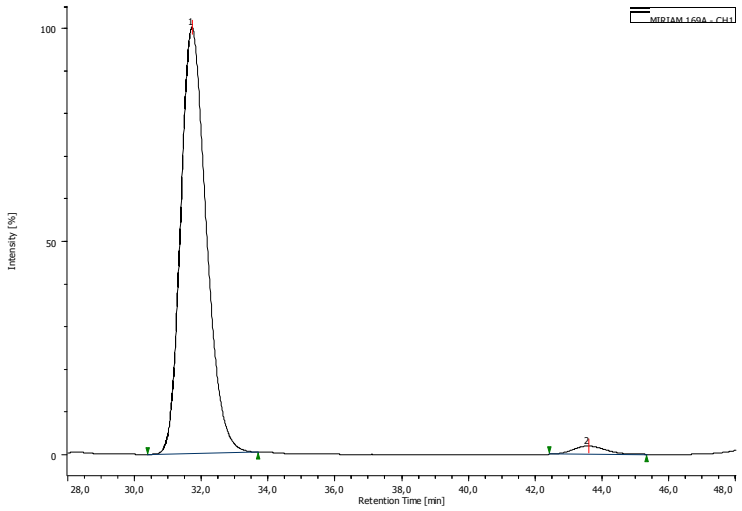


Racemic molecule:



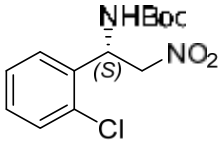
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	28,267	3924836	97855	50,241	56,382	1,094
2	37,275	3887249	75702	49,759	43,618	1,108

HPLC profile for entry 6, table 2. 96:4 er.

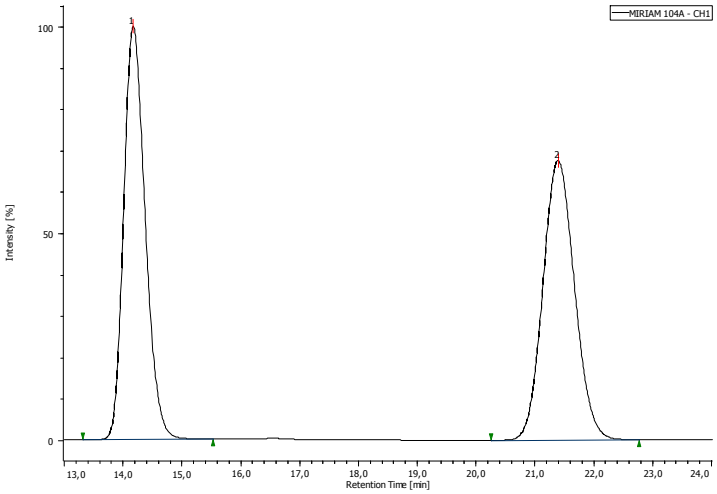


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	31,717	14722781	281146	95,737	95,516	1,296
2	43,583	655639	10148	4,263	3,484	1,096

(*S*)-*tert*-Butyl 1-(3-chlorophenyl)-2-nitroethylcarbamate (30d).

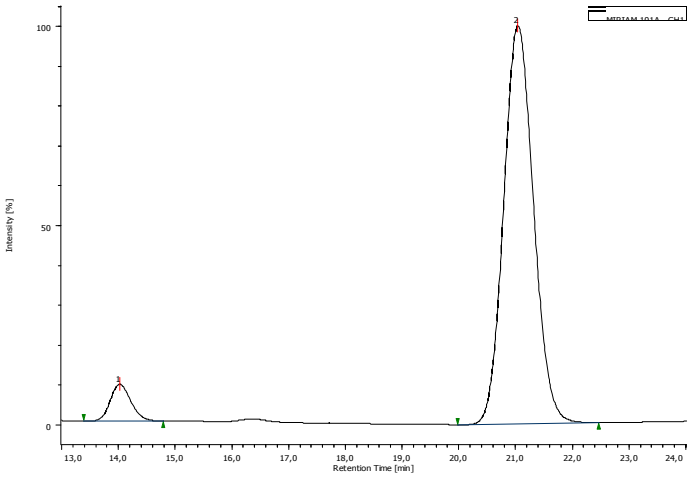


Racemic molecule:



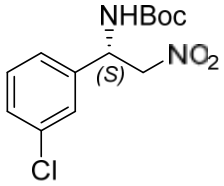
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	14,167	9371943	370725	50,047	59,637	1,244
2	21,383	9354258	250907	49,953	40,363	1,088

HPLC profile for entry 7, table 2. 94:6 er.

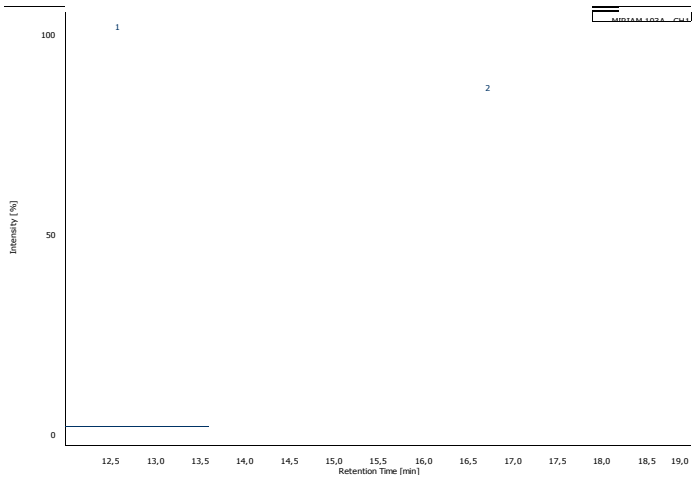


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	14,025	416975	16466	6,039	8,479	1,150
2	21,033	6488101	177722	93,961	91,521	1,095

(*S*)-*tert*-Butyl-1-(2-chlorophenyl)-2-nitroethylcarbamate (30e).

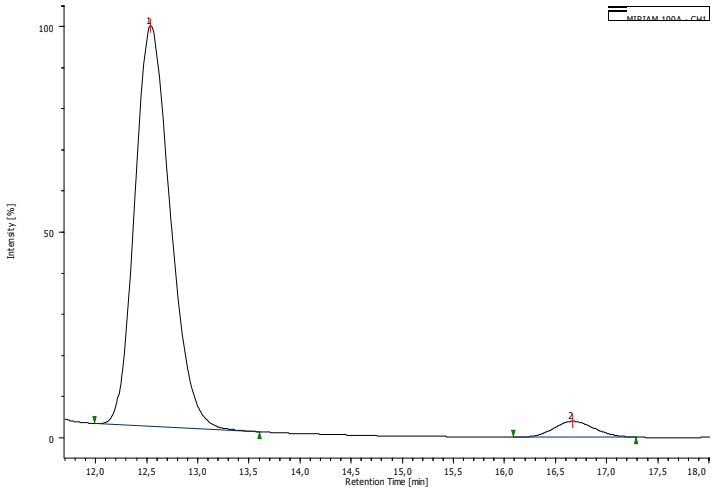


Racemic molecule:



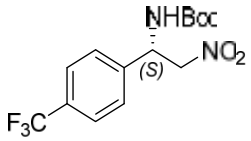
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	12,600	8599989	349690	50,230	54,434	1,220
2	16,742	8521225	292725	49,770	45,566	1,214

HPLC profile for entry 8, table 2. 96:4 er.

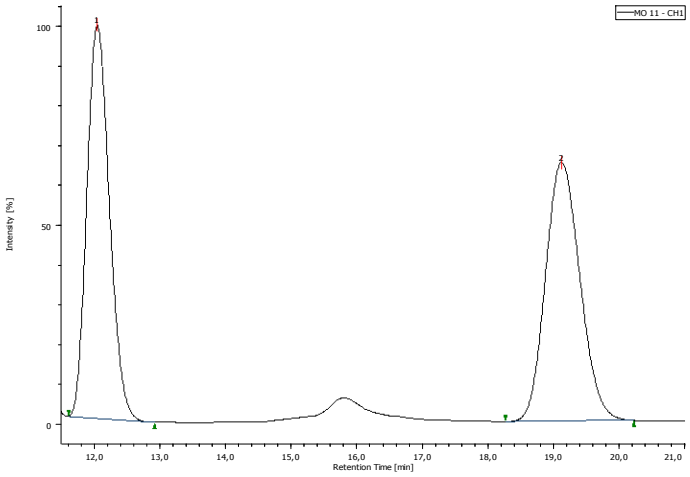


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	12,533	14501612	596079	95,645	96,164	1,223
2	16,658	660268	23779	4,355	3,836	1,124

(*S*)-*tert*-Butyl 2-nitro-1-(4-(trifluoromethyl)phenyl)ethylcarbamate (30f).

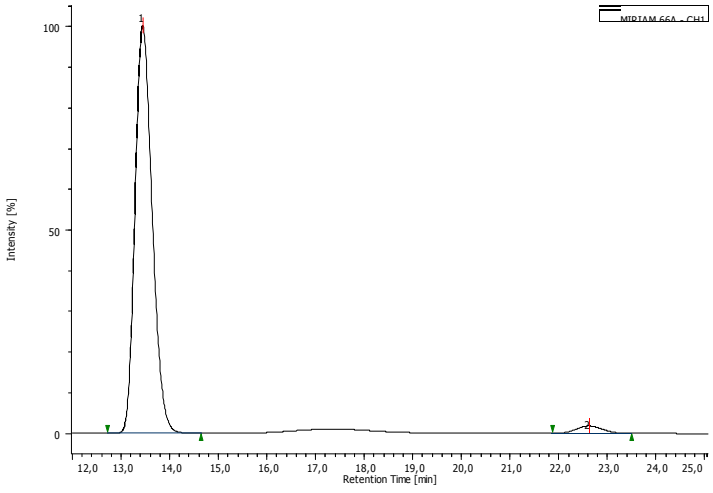


Racemic molecule:



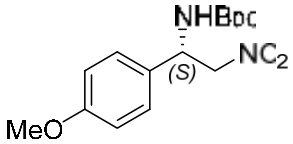
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	12,050	1709944	71659	49,790	60,284	1,163
2	19,125	1724368	47209	50,210	39,716	1,134

HPLC profile for entry 10, table 2. 97:3 er.

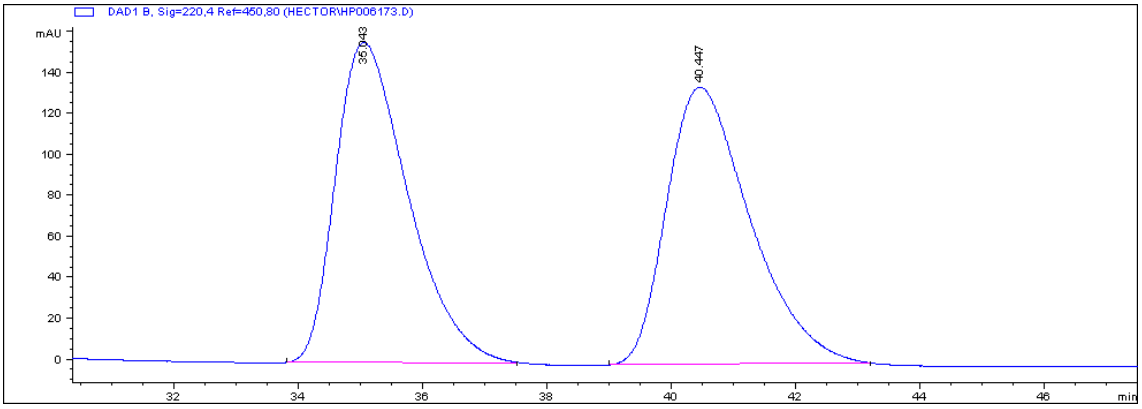


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	13,442	10124953	413507	97,260	98,184	1,233
2	22,608	285235	7647	2,740	1,816	1,065

(*S*)-*tert*-Butyl 1-(4-methoxyphenyl)-2-nitroethylcarbamate (30g).

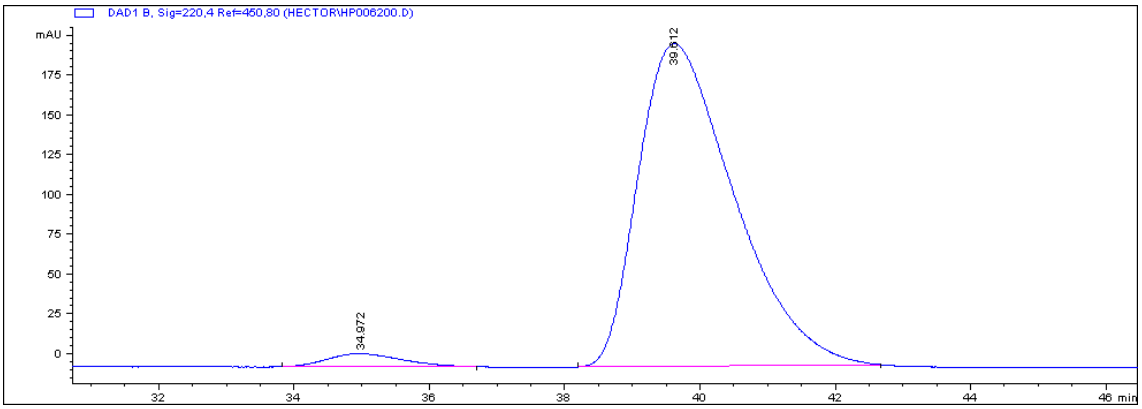


Racemic molecule:



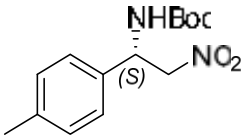
Peak Name	Time	Area	Height	Area%	Symmetry Factor
1	35.043	12696.5	156.3	50.029	0.597
2	40.447	12681.7	135.5	49.971	0.621

HPLC profile for entry 12, table 2. 97:3 er.

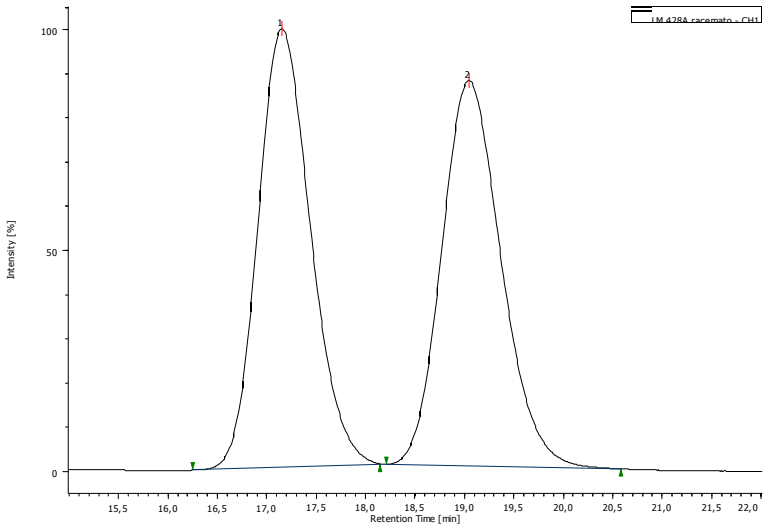


Peak Name	Time	Area	Height	Area%	Symmetry Factor
1	34.972	625.5	8.2	3.031	0.769
2	39.612	20010.6	202.8	96.969	0.586

(*S*)-*tert*-Butyl 2-nitro-1-p-tolylethylcarbamate (30h).

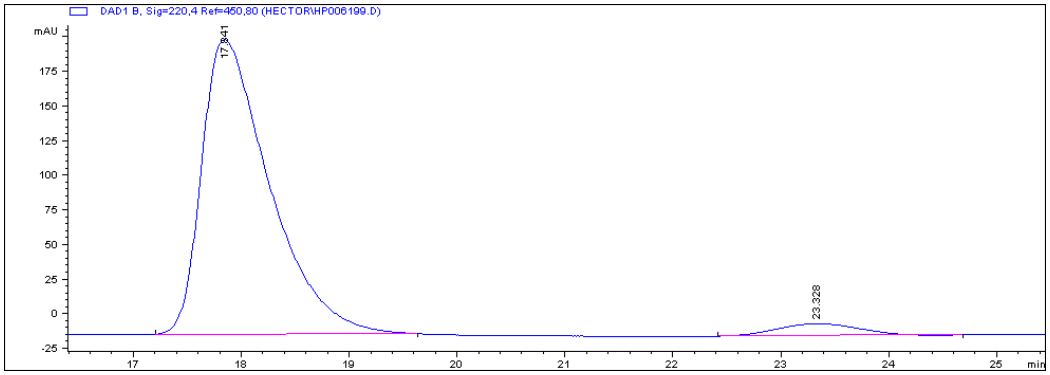


Racemic molecule:



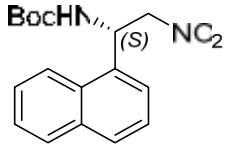
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	17,150	2878873	78039	50,143	53,216	1,170
2	19,042	2862505	68608	49,857	46,784	1,171

HPLC profile for entry 14, table 2. 95:5 er.

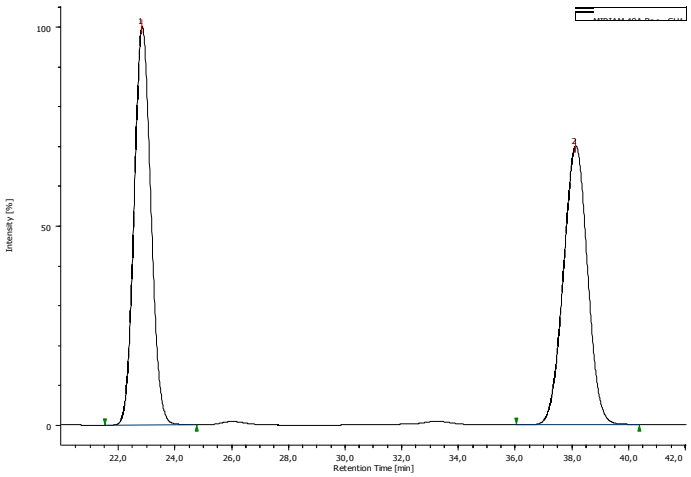


Peak Name	Time	Area	Height	Area%	Symmetry Factor
1	17.841	9352.9	213.2	95.474	0.474
2	23.328	443.4	8.6	4.526	0.945

(*S*)-*tert*-Butyl 1-(naphthalen-2-yl)-2-nitroethylcarbamate (30i).

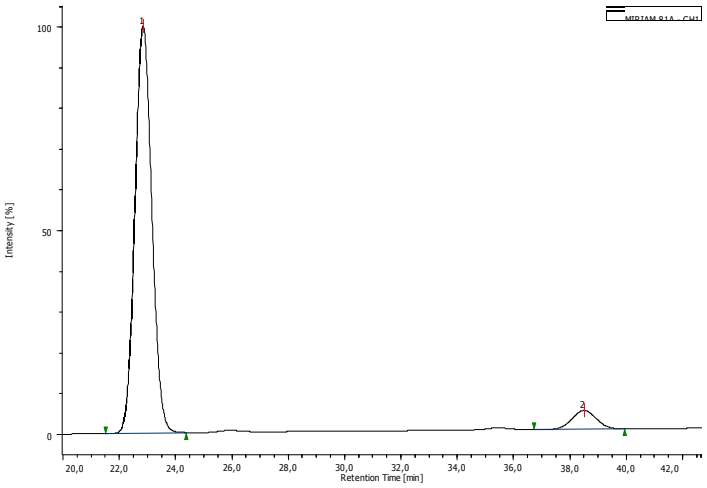


Racemic molecule:



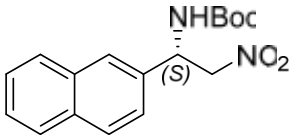
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	22,842	20313493	492921	49,959	58,853	1,083
2	38,117	20346601	344621	50,041	41,147	0,996

HPLC profile for entry 16, table 2. 94:6 er.

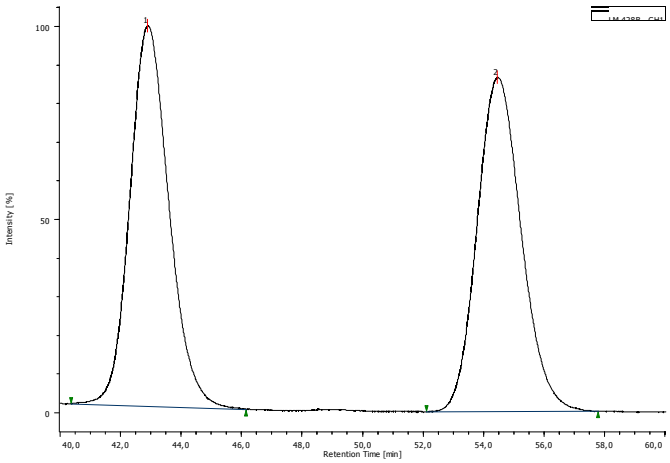


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	22,842	12820070	308669	94,071	95,718	1,076
2	38,483	808050	13810	5,929	4,282	1,017

(*S*)-*tert*-Butyl 1-(naphthalene-1-yl)-2-nitroethylcarbamate (30j).

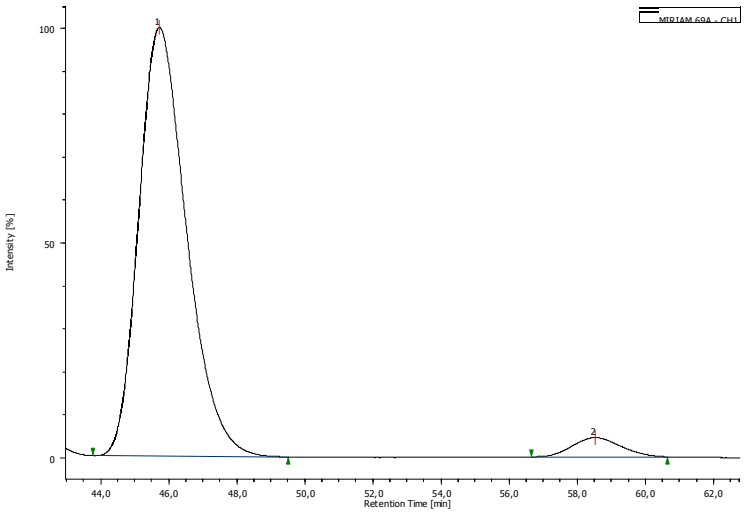


Racemic molecule:



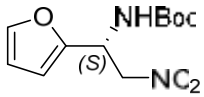
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	42,892	474407	5275	50,282	53,241	1,157
2	54,442	469077	4633	49,718	46,759	1,148

HPLC profile for entry 18, table 2. 96:4 er.

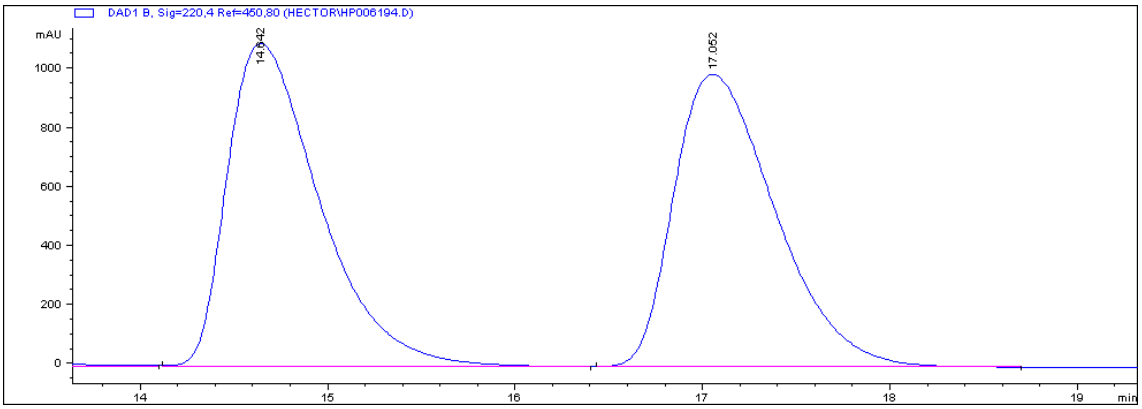


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	45,725	3807063	39192	95,669	95,731	1,298
2	58,508	172330	1748	4,331	4,269	1,134

(*S*)-*tert*-Butyl 1-(furan-2-yl)-2-nitroethylcarbamate (30k).

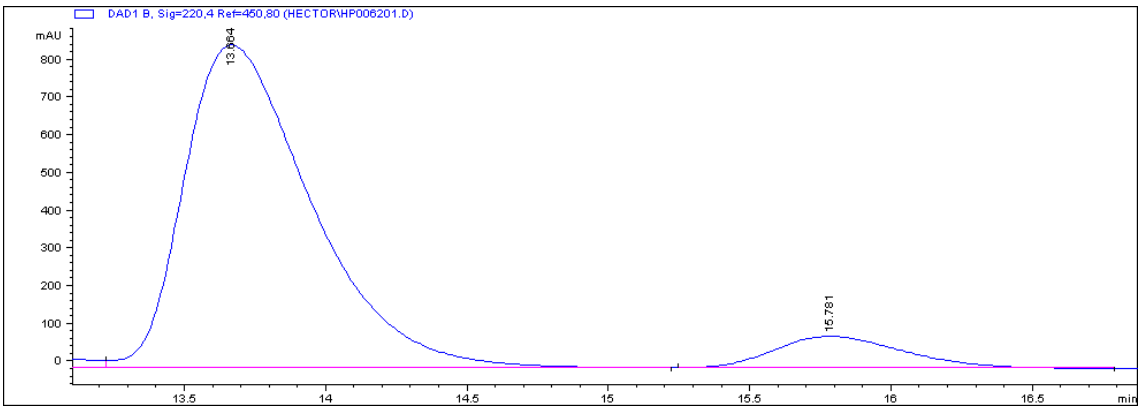


Racemic molecule:



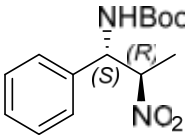
Peak Name	Time	Area	Height	Area%	Symmetry Factor
1	14.642	37643.9	1094.5	50.231	0.542
2	17.052	37297	991.6	49.769	0.589

HPLC profile for entry 20, table 2. 91:9 er.

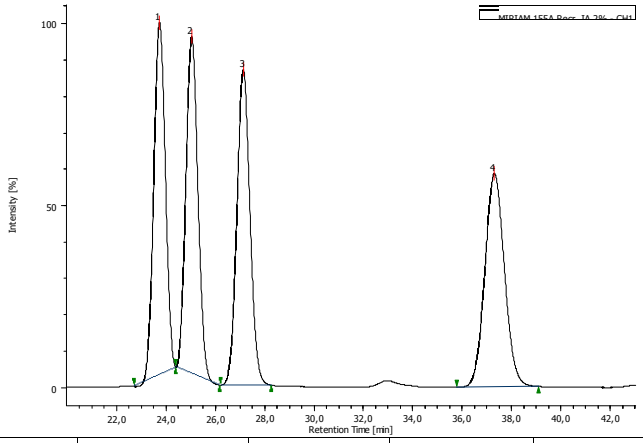


Peak Name	Time	Area	Height	Area%	Symmetry Factor
1	13.665	38830.8	1255.1	90.989	0.56
2	15.782	3845.4	119.3	9.011	0.736

***tert*-Butyl [(*1R, 2S*)-2-nitro-1-phenylpropyl]carbamate (32aa).**

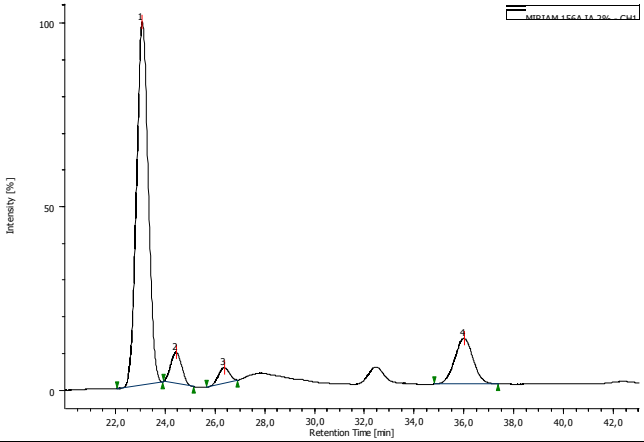


Racemic molecule:



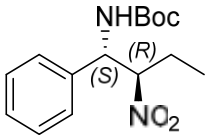
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	23,733	1146401	35210	24,773	28,926	1,015
2	25,042	1138341	33651	24,599	27,645	1,067
3	27,125	1164785	31538	25,170	25,909	1,059
4	37,283	1178084	21327	25,458	17,521	1,070

HPLC profile for entry 2, table 3. 82/18 rd, 92:8 er.

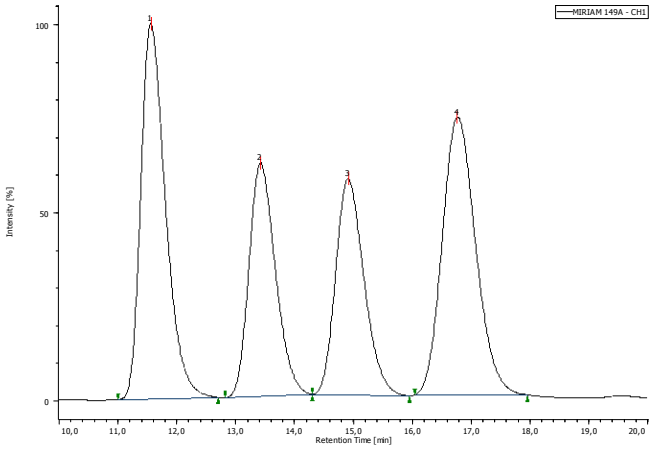


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	23,083	494869	15149	75,756	79,726	1,024
2	24,433	40200	1311	6,154	6,900	1,062
3	26,367	19936	640	3,052	3,369	0,961
4	35,992	98236	1901	15,038	10,005	0,996

***tert*-Butyl [(*1R, 2S*)-2-nitro-1-phenylbutyl]carbamate (32ab).**

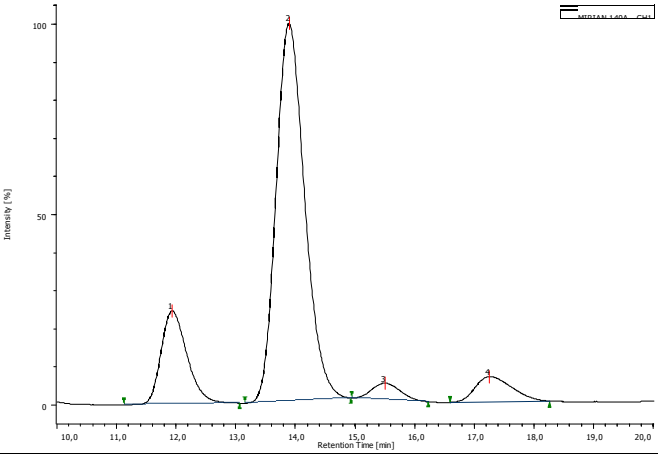


Racemic molecule:



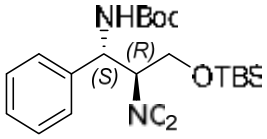
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	11,558	2055003	70329	30,018	34,021	1,384
2	13,425	1367043	43744	19,968	21,160	1,239
3	14,917	1361772	40513	19,891	19,598	1,238
4	16,775	2062185	52139	30,122	25,221	1,175

HPLC profile for entry 3, table 3. 78/22 rd, 96:4 er.

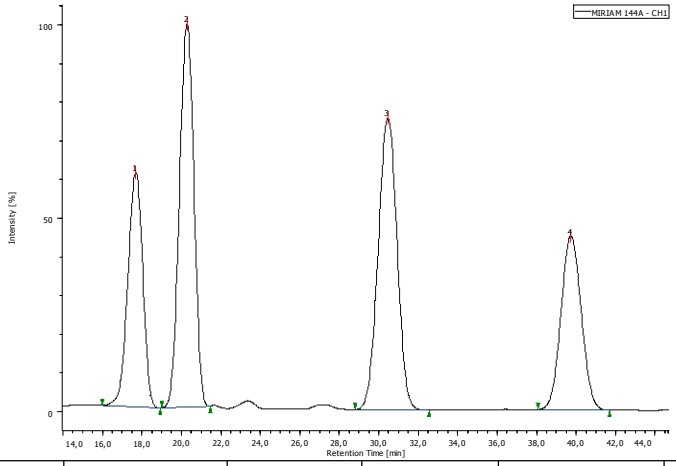


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	11,933	23574	739	2,450	3,930	1,221
2	13,892	820886	15281	85,316	81,277	1,261
3	15,500	101501	2389	10,549	12,709	1,068
4	17,250	16212	392	1,685	2,085	1,000

(*1S,2R*)-3-(*tert*-Butyldimethylsilyloxy)-2-nitro-1-phenylpropyl carbamic acid t-butyl ester (32ac).

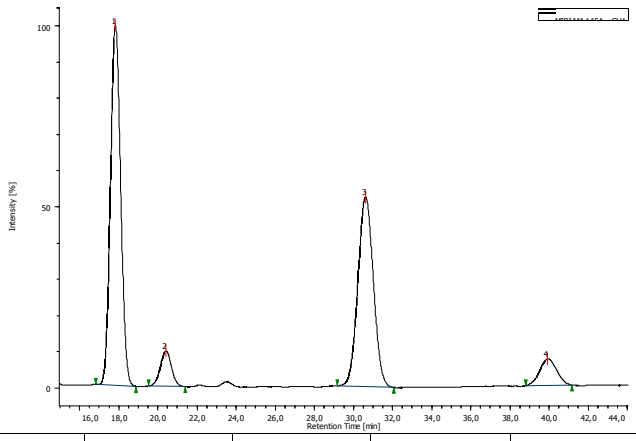


Racemic molecule:



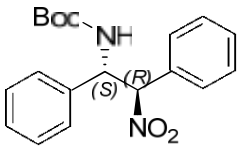
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	17,717	757254	14355	19,387	21,619	0,921
2	20,308	1199299	23481	30,704	35,364	0,964
3	30,475	1190332	17905	30,474	26,965	0,981
4	39,733	759142	10659	19,435	16,053	1,040

HPLC profile for entry 4, table 3. 56/44 rd, 88:12 er.

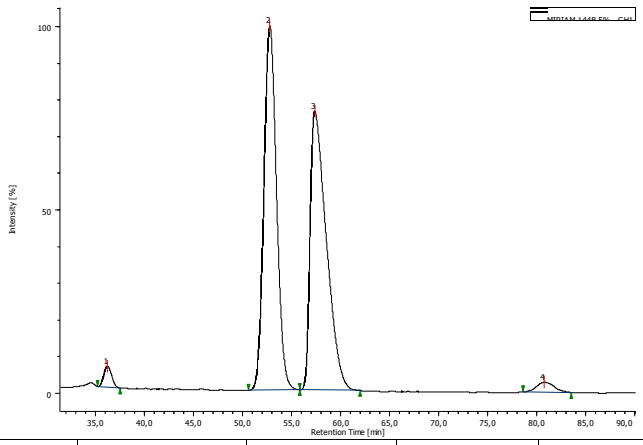


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	17,825	654345	17975	49,395	58,878	1,065
2	20,400	70058	1766	5,289	5,784	1,019
3	30,600	520219	9464	39,270	30,999	1,030
4	39,908	80096	1325	6,046	4,339	1,037

***tert*-Butyl ((*1S,2R*)-2-nitro-1,2-diphenylethyl)carbamate (32ad).**

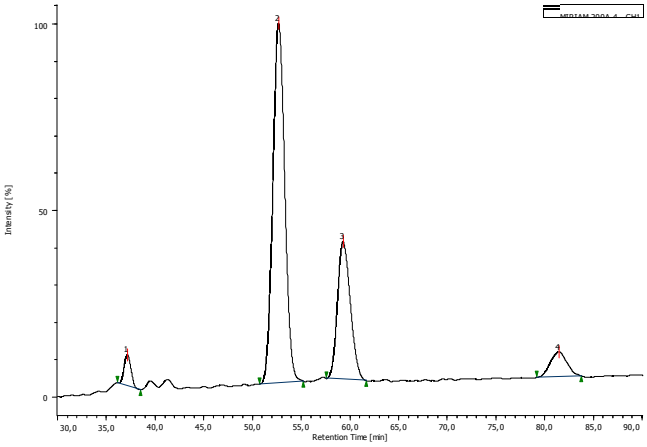


Racemic molecule:



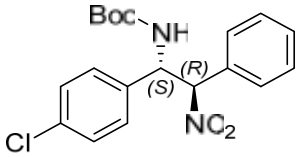
Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	36,250	316358	5833	1,686	3,093	1,108
2	52,800	9123409	101907	48,619	54,034	1,110
3	57,375	8968533	78068	47,794	41,394	1,982
4	80,708	356641	2790	1,901	1,479	1,174

HPLC profile for entry 6, table 3. 91/9 rd, 71:29 er.

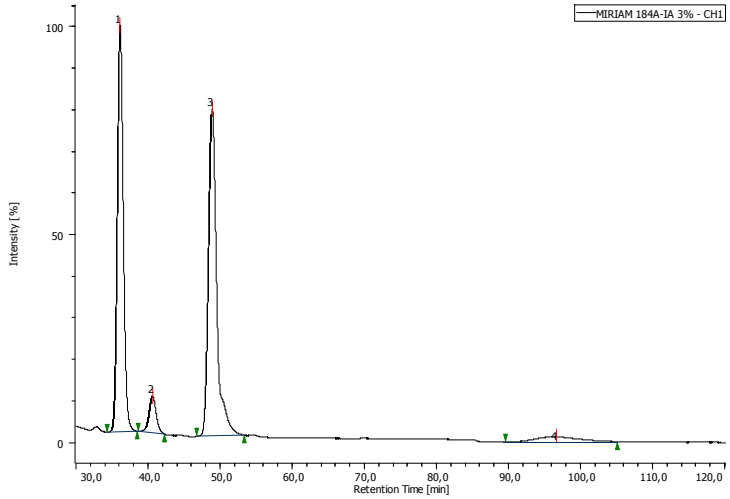


Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	37,150	175790	3583	3,207	5,636	1,082
2	52,667	3508520	41321	64,014	64,991	1,067
3	59,283	1459770	15828	26,634	24,895	1,197
4	81,408	336779	2847	6,145	4,478	1,062

***tert*-Butyl ((*1S,2R*)-1-(4-chlorophenyl)-2-nitro-2-phenylethyl)carbamate (32cd).**

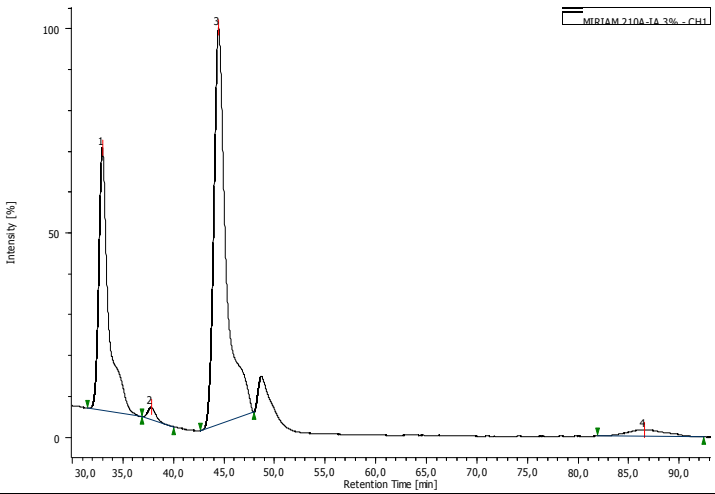


Racemic molecule:



Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	36,133	3570265	62131	43,637	52,405	1,124
2	40,617	397357	5727	4,857	4,830	0,999
3	48,900	3928736	49989	48,019	42,165	1,465
4	96,467	285342	711	3,488	0,600	1,201

HPLC profile for entry 7, table 3. 96/4 rd, 66:34 er.



Peak Name	tR	Area	Height	Area%	Height%	Symmetry Factor
1	32,983	990855	14689	32,669	38,717	2,025
2	37,808	37391	705	1,233	1,859	1,162
3	44,467	1906677	22188	62,864	58,481	1,912
4	86,500	98112	358	3,235	0,943	1,245