A waste-minimized protocol for the preparation of 1,2-azido alcohols and 1,2-amino alcohols.

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EXPERIMENTAL DATA

Unless otherwise stated, all chemicals were purchased and used without any further purification. GC analyses were performed by using Hewlett-Packard HP 5890A equipped with a capillary column DB-35MS (30 m, 0.53 mm), a FID detector and helium as gas carrier. GC-EIMS analysis were carried out by using a Hewlett-Packard HP 6890N Network GC system/5975 Mass Selective Detector equipped with an electron impact ionizer at 70 eV.

All ^{1}H NMR and ^{13}C NMR spectra were recorded at 200 MHz or 400 MHz, and at 50.3 or 100.6 MHz respectively, using a Bruker DRX-ADVANCE 200 MHz and a Bruker DRX-ADVANCE 400 MHz spectrometers. The deuterated solvent used was $CDCl_3$, and TMS was employed as internal standard. Chemical shifts were reported in ppm and coupling constants in hertz. Elemental analyses were realized by using a FISONS instrument EA 1108 CHN.

1,2-Azido alcohols **4a**[1], **4b**[1], **4c**[1] ,**4d**[1], **4e**,[1] **4f**[1], **4g**[4], **4h**,[1,5] **4i**[2,3] and 1,2 amino alcohols **5a**[6], **5c**[7], **5f** [7] are known compounds. *O*-TMS protected 1,2-azido alcohols **3a, 3ba, 3bb, 3c, 3da, 3db, 3e, 3f, 3ga, 3gb, 3ha, 3hb, 3ia, 3ib** have not been previously reported.

Batch experimental procedures for the preparation of *O*-TMS-protected 1,2- azido alcohols 3a-i and for their deprotection in aqueous medium to the corresponding 1,2-azido alcohols 4a-i.

3-Azido-1-phenoxy-2-(trimethylsilyloxy)-propane (3a)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1a** (Table 1, Entry 1) (0.150 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give pure 3-azido-1-phenoxy-2-(trimethylsilyloxy)-propane (**3a**) [0.262 g, 99% yield, $R_f = 0.61$ (hexane/AcOEt 8:2)], as a colourless oil.

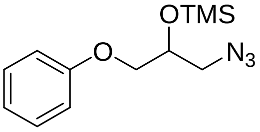
E-Factor: oxirane **1a** (150 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (262 mg)/ product mass (262 mg) = 7.0.

3a ^1H NMR ($CDCl_3$) δ: 7.24-7.34 (m, 2H), 6.83-7.00 (m,3H), 4.18 (dd, 1H, *J* = 11.9, 6.0, 4.0 Hz), 3.92 (d, 2H, *J* = 8.0 Hz), 3.42 (dd, 1H, *J* = 12.6, 4.0 Hz), 3.34 (dd, 1H, *J* = 12.6, 6.0 Hz), 0.20 (s, 9H).

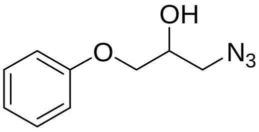
Anal. Calcd for $C_{12}H_{19}SiN_3O_2$: C, 54.31; H, 7.22; N, 15.83. Found: C, 54.09; H, 6.98; N, 15.64.

1-Azido-3-phenoxy-2-propanol (4a)

A solution of azido derivative **3a** (0.200 g, 0.75 mmol) in 3:1:1 AcOH:THF:H_2O (10.0 mL) was stirred at room temperature for 2 h. Dilution with Et_2O and evaporation of the washed (sat. aq. $NaHCO_3$ and brine) organic solution afforded a crude product (0.130 g, 90% yield) consisting of pure 1-azido-3-phenoxy-2-propanol (**4a**),[1] as a colourless oil.



3a



4a

1-Azido-1-phenyl-2-(trimethylsilyloxy)-ethane (3ba) and 2-Azido-1-phenyl-1-(trimethylsilyloxy)-ethane (3bb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1b** (Table 1, Entry 2) (0.120 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give a reaction product (0.224 g 95% yield) consisting of a 77:23 mixture (^{1}H NMR) of *O*-TMS-protected azido alcohols **3ba** and **3bb** which was subjected to preparative TLC (9.5:0.5 hexane/CH_2Cl_2). Extraction of the two more intense bands afforded 1-azido-1-phenyl-2-(trimethylsilyloxy)-ethane (**3ba**) (0.148 g, 63% yield, R_f = 0.17) and 2-azido-1-phenyl-1-(trimethylsilyloxy)-ethane (**3bb**) [0.036 g, 15% yield, R_f = 0.23 (9.5:0.5 hexane/CH_2Cl_2)]. as colourless oils.

E-Factor: oxirane **1b** (120 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (224 mg)/ product mass (224 mg) = 8.2.

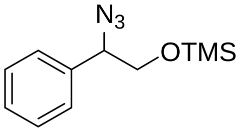
3ba ^{1}H NMR ($CDCl_3$) δ: 7.27-7.43 (m, 5H), 4.58-4.72 (m, 1H), 3.68-3.84 (m, 2H), 0.13 (s, 9H). Anal. Calcd for $C_{11}H_{17}SiN_3O$: C, 56.14; H, 7.28; N, 17.85; Found: C,55.96; H, 7.05; N, 17.69.

3bb ^{1}H NMR ($CDCl_3$) δ 7.27-7.43 (m, 5H), 4.85 (dd, 1H, *J* = 8.4, 3.3 Hz), 3.39 (dd, 1H, *J* = 12.7, 8.4,Hz), 3.11 (dd, 1H, *J* = 12.7, 3.3 Hz) 0.09 (s, 9H).

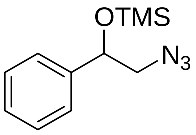
Anal. Calcd for $C_{11}H_{17}SiN_3O$: C, 56.14; H, 7.28; N, 17.85; Found: C, 56.32; H, 7.01; N, 17.51.

2-Azido-2-phenyl-1-ethanol (4ba) and 2-azido-1-phenyl-1-ethanol (4bb)

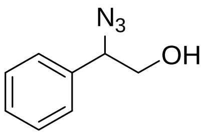
A solution of azido derivatives **3ba** and **3bb** (0.200 g, 0.850 mmol) in a 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.132 g, 95% yield) consisting of a 77:23 mixture (^{1}H NMR) of 2-azido-2-phenyl-1-ethanol (**4ba**)[1] and 2-azido-1-phenyl-1-ethanol (**4bb**)[1] as a colourless oil.



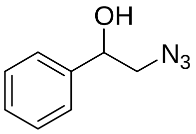
3ba



3bb



4ba



4bb

trans-2-Azido-1-(trimethylsilyloxy)-cyclohexane (3c)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1c** (Table 1, Entry 3) (0.098 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give (0.206 g, 96% yield) pure *trans*-2-azido-1-(trimethylsilyloxy)-cyclohexane (**3c**) [R$_f$ = 0.71 (7:3 hexane/AcOEt)], as a colourless oil.

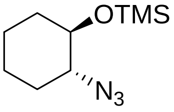
E-Factor: oxirane **1c** (98 mg) + TMSN$_3$ (126.5 mg) + PS-DABCOF$_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (206 mg)/ product mass (206 mg) = 8.9.

3c ^{1}H NMR (CDCl$_3$) δ: 3.37-3.48 (m, 1H), 3.11-3.24 (m, 1H), 1.79-1.96 (m, 2H), 1.59-1.73 (m, 2H), 1.08-1.44 (m, 4H), 0.16 (s, 9H).

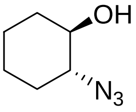
Anal. Calcd for $C_9H_{19}SiN_3O$: C, 50.67; H, 8.97; N, 19.69 Found: C, 50.41; H, 8.68; N, 19.33.

trans-2-Azido-1-cyclohexanol (4c)

A solution of compound **3c** (0.200 g, 0.940 mmol) in 3:1:1 AcOH:THF:H$_2$O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded pure *trans*-2-azido-1-cyclohexanol (**4c**) (0.120 g 90% yield), as a colourless oil.[1]



3c



4c

t-2-Azido-1-methyl-*r*-1-(trimethylsilyloxy)-cyclohexane (3da) and *t*-2-azido-2-methyl-*r*-1-(trimethylsilyloxy)-cyclohexane (3db)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1d** (Table 1, Entry 4) (0.112 g, 1.00 mmol), TMSN$_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-DABCOF$_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give (0.218 g, 96 % yield) a 1:1 unseparable mixture (^{1}H NMR) of pure *t*-2-azido-1-methyl-*r*-1-(trimethylsilyloxy)-cyclohexane (**3da**) and *t*-2-azido-2-methyl-*r*-1-(trimethylsilyloxy)-cyclohexane (**3db**), as a colourless oil: R$_f$ = 0.88 (9.5:0.5 hexane/AcOEt).

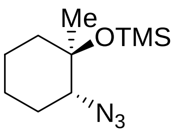
E-Factor: oxirane **1d** (112 mg) + TMSN$_3$ (126.5 mg) + PS-DABCOF$_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (218 mg)/ product mass (218 mg) = 8.4.

3da, 3db (1:1 mixture) ^{1}H NMR ($CDCl_3$) δ: 3.52 (dd, 1H, *J* = 8.6, 3.7 Hz), 3.36 (dd, 1H, *J* = 9.9, 4.2 Hz), 1.29-1.88 (m,16H), 1.27 (s, 3H), 1.24 (s, 3H), 0.14 (s, 9H), 0.13 (s, 9H).

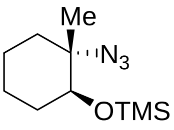
Anal. Calcd for $C_{10}H_{21}SiN_3O$: C, 52.82; H, 9.31; N, 18.48. Found: C, 52,57; H, 9.24; N, 18,13.

t-2-azido-1-methyl-*r*-1-cyclohexanol (4da) and *t*-2-azido-2-methyl-*r*-1-cyclohexanol (4db)

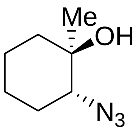
A solution of the mixture of azido derivatives **3da** and **3db** (0.200 g, 0.88 mmol) in a 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.132 g, 96% yield) consisting of a 1:1 unseparable mixture (^{1}H NMR) of the corresponding *t*-2-azido-1-methyl-*r*-1-cyclohexanol (**4da**)[1] and *t*-2-azido-2-methyl-*r*-1-cyclohexanol (**4db**), as a colourless oil.[1]



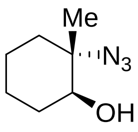
3da



3db



4da



4db

t-2-azido-2-phenyl-*r*-1-(trimethylsilyloxy)-cyclohexane (3e)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1e** (Table 1, Entry 5) (0.174 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 120 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give a crude reaction product consisting of *O*-TMS-protected *trans* azido alcohol **3e** [0.288 g, R_f = 0.42 (9.5:0.5 hexane/CH_2Cl_2)] which was subjected to preparative TLC (9.5:0.5 hexane/CH_2Cl_2). Extraction of the more intense band afforded pure *t*-2-azido-2-phenyl-*r*-1-(trimethylsilyloxy)-cyclohexane (**3e**) (0.276 g, 95 % yield), as a colourless oil.

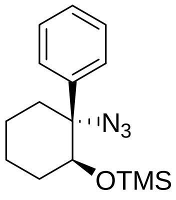
E-Factor: oxirane **1e** (174 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + washing AcOEt (1788 mg) + (12 mg) – product mass (276 mg)/ product mass (276 mg) = 6.7.

3e ^{1}H NMR ($CDCl_3$) δ: 7.21-7.51 (m, 5H), 3.64 (bs, 1H), 2.43-2.59 (m, 1H), 1.37-2.08 (m, 7H), 0.25 (s, 9H).

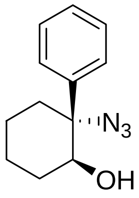
Anal. Calcd for $C_{15}H_{23}SiN_3O$: C, 64.08; H, 5.37; N, 14.95. Found: C, 64.29; H, 5.11; N, 14.74.

t-2-azido-2-phenyl-*r*-1-cyclohexanol (4e)

A solution of azido derivative **3e** (0.200 g, 0.692 mmol) in 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.141 g 94% yield) consisting of pure *t*-2-azido-2-phenyl-*r*-1-cyclohexanol (**4e**), as a colourless oil.[1]



3e



4e

1-Azido-2-(trimethylsilyloxy)-octane (3f)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1f** (Table 1, Entry 6) (0.128 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-DABCOF_2 (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give a crude reaction product mostly consisting of *O*-TMS protected azido alcohol **3f** (0.260 g), [R_f = 0.16 (9.5:0.5 hexane/CH_2Cl_2)] which was subjected to preparative TLC (9.5:0.5 hexane/CH_2Cl_2). Extraction of the more intense band afforded pure 1-azido-2-(trimethylsilyloxy)-octane (**3f**) (0.232 g, 95% yield), as a colourless oil.

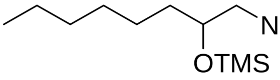
E-Factor: oxirane **1f** (128 mg) + $TMSN_3$ (126.5 mg) + PS-DABCOF_2 (20 mg) + washing AcOEt (1788 mg) + (28 mg) – product mass (232 mg)/ product mass (232 mg) = 8.0.

3f ^{1}H NMR ($CDCl_3$) δ:3.76 (ddd, 1H, *J* = 11.8, 5.8, 4.6 Hz), 3.17 (bs, 1H), 3.14-3.16 (m, 1H), 1.22-1.54 (m, 3H), 0.15 (s, 9H).

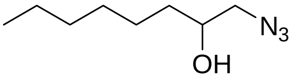
Anal. Calcd for $C_{11}H_{25}SiN_3O$: C, 54.28; H, 10.35; N, 17.26 Found: C, 54.15; H, 10.05; N, 17.09.

1-Azido-2-octanol (4f)

A solution of azido derivative **3f** (0.200 g, 0.82 mmol) in 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.13 g 92% yield) consisting of practically pure 1-azido-2-octanol (**4f**),[1] as a colourless oil.



3f



4f

1-Azido-2-methyl-2-(trimethylsilyloxy)-eptane (3ga) and 2-azido-2-methyl-1-(trimethylsilyloxy)-eptane (3gb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1g** (Table 1, Entry 7) (0.128 g, 1.00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 24 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give a reaction product (0.223 g, 92% yield) consisting of a 30:70 pure mixture (^{1}H NMR) of the unseparable 1-azido-2-methyl-2-(trimethylsilyloxy)-eptane (**3ga**) and 2-azido-2-methyl-1-(trimethylsilyloxy)-eptane (**3gb**) [R_f = 0.74 (9.5:0.5 hexane/AcOEt)], as a colourless oil.

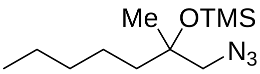
E-Factor: oxirane **1g** (128 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (223 mg)/ product mass (223 mg) = 8.2.

3ga, 3gb (30:70 mixture) ^{1}H NMR ($CDCl_3$) δ: 3.50 (d, 1H, J = 12.3 Hz), 3.44 (d, 1H, J = 12.3 Hz), 3.09 (d, 1H, J = 12.2 Hz), 3.02 (d, 1H, J = 12.2 Hz), 1.23-1.60 (m, 4H), 1.24-1.38 (m, 12H), 1.23 (s, 3H), 1.18 (m, 3H), 0.89 (t, 6H, J = 6.6 Hz), 0.14 (s, 18H).

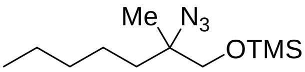
Anal. Calcd for $C_{11}H_{25}SiN_3O$: C, 54.28; H, 10.35; N, 17.26. Found: C, 53.97; H, 10.24; N, 17.02.

1-Azido-2-methyl-2-heptanol (4ga) and 2-azido-2-methyl-1-heptanol (4gb)

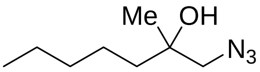
A solution of a 30:70 mixture (^{1}H NMR) of azido derivatives **3ga** and **3gb** (0.200 g, 0.82 mmol) in a 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.133 g 95%yield) consisting of a 30:70 pure mixture of 1-azido-2-methyl-2-heptanol (**4ga**)[4] and 2-azido-2-methyl-1-heptanol (**4gb**),[4] as a colourless oil.



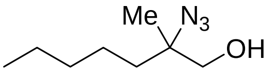
3ga



3gb



4ga



4gb

1-(Azidomethyl)-1-(trimethylsilyloxy)-cyclohexane (3ha) and 1-azido-1-(trimethylsilyloxy methyl)-cyclohexane (3hb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1h** (Table 1, Entry 8) (0.112 g, 1.00 mmol), TMSN_3 (**2**) (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-DABCOF_2 (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give a reaction mixture (0.190 g, 83 % yield) consisting of 20:80 mixture (^{1}H NMR) of pure unseparable 1-(azidomethyl)-1-(trimethylsilyloxy)-cyclohexane (**3ha**) and 1-azido-1-(trimethylsilyloxymethyl)-cyclohexane (**3hb**), as a colourless oil: R_f = 0.78 (8:2 hexane/AcOEt).

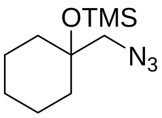
E-Factor: oxirane **1h** (112 mg) + TMSN_3 (126.5 mg) + PS-DABCOF_2 (20 mg) + washing AcOEt (1788 mg) – product mass (190 mg)/ product mass (190 mg) = 9.8.

3ha, 3hb (20:80 mixture) ^{1}H NMR δ: 3.51 (bs, 2H), 3.20 (bs, 2H), 1.27-1.75 (m, 16H), 0.15 (s, 9H), 0.14 (s, 9H).

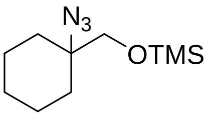
Anal. Calcd for $\text{C}_{10}\text{H}_{21}\text{SiN}_3\text{O}$: C, 52.82; H, 9.31; N, 18.48. Found: C, 52.67; H, 9.08; N, 18.21.

1-(Azidomethyl)-1-cylohexanol (4ha) and 1-azido-1-cyclohexanemethanol (4hb)

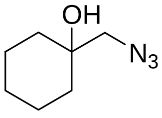
A solution of 20:80 mixture (^{1}H NMR) of the azido derivatives **3ha** and **3hb** (0.200 g, 0.880 mmol) in a 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.120 g 88% yield) consisting of a 20:80 pure mixture (^{1}H NMR) of the 1-(azidomethyl)-1-cyclohexanol (**4ha**)[1,5] and 1-azido-1-cyclohexanemethanol (**4hb**),[1,5] as a colourless oil.



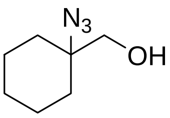
3ha



3hb



4ha



4hb

Methyl *anti*-2-azido-3-(trimethylsilyloxy)-butanoate (3ia) and methyl *anti*-3-azido-2-(trimethylsilyloxy)-butanoate (3ib)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1i** (Table 1, Entry 9) (0.116 g, 1.00 mmol), $TMSN_3$ **(2)** (0.1265 g, 1.10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated to give a practically pure reaction product (0.219 g, 95% yield) consisting of a 77:23 pure mixture (^1H NMR) of methyl *anti*-2-azido-3-(trimethylsilyloxy)-butanoate (**3ia**) (R_f = 0.81) and methyl *anti*-3-azido-2-(trimethylsilyloxy)-butanoate (**3ib**), R_f = 0.81 (8:2 hexane/AcOEt), as a colourless oil.

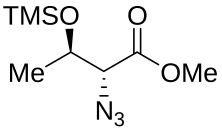
E-Factor: oxirane **1i** (116 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + washing AcOEt (1788 mg) – product mass (219 mg)/ product massa (219 mg) = 8.4.

3ia, 3ib (77:23 mixture) ^1H NMR δ: 4.17- 4.29 (m, 2H), 3.77-3.87 (m, 2H), 3.78 (s, 3H), 3.75 (s, 3H), 1.28 (d, 3H, *J* = 6.7 Hz), 1.24 (d, 3H, *J* = 6.2 Hz), 0.17 (s, 3H), 0.13 (s, 3H).

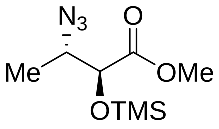
Anal. Calcd for $C_8H_{17}SiN_3O_3$: C, 45.54; H, 7.41; N, 18.16. Found: C, 45.28; H, 7.09; N, 17.91.

Methyl *anti*-2-azido-3-hydroxybutanoate (4ia) and methyl *anti*-3-azido-2-hydroxybutanoate (4ib)

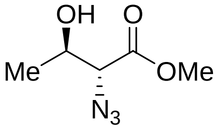
A solution of 77:23 mixture (^1H NMR) of azido derivatives **3ia** and **3ib** (0.200 g, 0.866 mmol) in a 3:1:1 AcOH:THF:H_2O mixture (10.0 mL) was stirred at room temperature for 40 min. Typical work-up afforded a crude product (0.126 g 92% yield) consisting of a 77:23 mixture (^1H NMR) of practically pure methyl *anti*-2-azido-3-hydroxybutanoate (**4ia**)[2,3] and methyl *anti*-3-azido-2-hydroxybutanoate (**4ib**),[2,3] as a colourless oil.



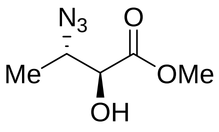
3ia



3ib



4ia



4ib

Batch experimental procedures for the preparation of 1,2-azido alcohols 4a-i

1-Azido-3-phenoxy-2-propanol (4a)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1a** (Table 1 entry 1) (0.150 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give pure 1-azido-3-phenoxy-2-propanol (**4a**)[1] (0.174 g, 90% yield), as a colourless oil.

E- Factor: oxirane **1a** (150 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (174 mg)/ product mass (174 mg) = 16.8.

2-Azido-2-phenyl-1-ethanol (4ba) and 2-Azido-1-phenyl-1-ethanol (4bb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1b** (Table 1 entry 1) (0.120 g, 1,00 mmol), $TMSN_3$ **(2)** (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give a 77:23 mixture (^{1}H NMR) of 2-azido-2-phenyl-1-ethanol (**4ba**)[**1**] and 2-azido-1-phenyl-1-ethanol (**4bb**)[**1**] (0.155 g, 95% yield), as a colourless oil.

E- Factor: oxirane **1b** (120 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (155 mg)/ product mass (155 mg) = 18.8.

***trans*-2-Azido-1-cyclohexanol (4c)**

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1c** (Table 1 entry 1) (0.098 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give pure *trans*-2-azido-1-cyclohexanol (**4c**)[1] (0.135 g, 96% yield), as a colourless oil.

E- Factor: oxirane **1c** (98 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (135 mg)/ product mass (135 mg) = 21.6.

***t*-2-azido-1-methyl-*r*-1cyclohexanol (4da) and *t*-2-azido-2-methyl-1-cyclohexanol (4db)**

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1d** (Table 1 entry 1) (0.112 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give a 1:1 (^{1}H NMR) unseparable mixture of *t*-2-azido-1-methyl-*r*-1cyclohexanol (**4da**)[1] and *t*-2-azido-2-methyl-1-cyclohexanol (**4db**)[1] (0.149 g, 96% yield), as a colourless oil.

E- Factor: oxirane **1d** (112 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (149 mg)/ product mass (149 mg) = 19.6.

***t*-2-azido-2-phenyl-r-1-cyclohexanol (4e)**

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1e** (Table 1 entry 5) (0.174 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 120 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h. The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0,100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give practically pure *t*-2-azido-2-phenyl-r-1-cyclohexanol (**4e**)[1] (0.200 g, 95% yield), as a colourless oil.

E- Factor: oxirane **1e** (174 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (200 mg)/ product mass (200) = 14.6.

1-Azido-2-octanol (4f)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1f** (Table 1 entry 6) (0.128 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h. The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give practically pure 1-azido-2-octanol (**4f**)[1] (0.161 g, 94% yield), as a colourless oil.

E- Factor: oxirane **1f** (128 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (161 mg)/ product mass (161 mg) = 18.1.

1-Azido-2-methyl-2-heptanol (4ga) and 2-azido-2-methyl-1-heptanol (4gb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1g** (Table 1 entry 7) (0.128 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol,

0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 80 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 24 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give a 30:70 mixture (^1H NMR) of 1-azido-2-methyl-2-heptanol (**4ga**)[4] and 2-azido-2-methyl-1-heptanol (**4gb**)[4] (0.154 g, 90% yield), as a colourless oil.

E- Factor: oxirane **1g** (128 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (154 mg)/ product mass (154 mg) = 19.0.

1-(Azidomethyl)-1-cyclohexanol (4ha) and 1-azido-1-cyclohexanemethanol (4hb)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1h** (Table 1 entry 8) (0.112 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol, 0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 96 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give pure 20:80 mixture (^1H NMR) of 1-(azidomethyl)-1-cyclohexanol (**4ha**)[1,5] and 1-azido-1-cyclohexanemethanol (**4hb)**[1,5] (0.127 g, 82% yield), as a colourless oil.

E-Factor: oxirane **1h** (112 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (112 mg)/ product mass (112 mg) = 23.1.

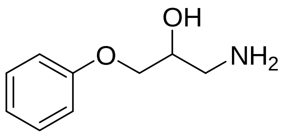
Methyl *anti*-2-azido-3-hydroxybutanoate (4ia) and methyl *anti*-3-azido-2-hydroxybutanoate (4ib)

In a screw-capped vial equipped with a magnetic stirrer, oxirane **1i** (Table 1 entry 9) (0.116 g, 1,00 mmol), $TMSN_3$ (**2**) (0.1265 g, 1,10 mmol, 1.10 equiv) and PS-$DABCOF_2$ (0.020 g, 0.100 mmol,

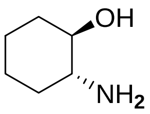
0.10 equiv) were consecutively added. The resulting reaction mixture was stirred at 60 °C and monitored by TLC analysis (hexane/AcOEt 8:2). After 18 h, AcOEt (1.0 mL) was added and the catalyst was filtered off and washed with AcOEt (1.0 mL). To the collected organic phase 20% of DOWEX 50Wx8H wet (25 mg) was added and the resulting mixture was sirred at 30 °C for 5 h.
The solid catalyst was then separated from the organic phase by filtration and washed with AcOEt (1.0 mL). The combined organic phases were dried over sodium sulphate/potassium carbonate (2:1 mixture 0.100 g). The excess of $TMSN_3$ (**2**) and solvent were removed under high vacuum at 50 °C to give pure 77:23 mixture (^1H NMR) of methyl *anti*-2-azido-3-hydroxybutanoate (**4ia**)[2,3] and methyl *anti*-3-azido-2-hydroxybutanoate **(4ib)**[2,3] (0.150 g, 94% yield), as a colourless oil.

E-Factor: oxirane **1i** (116 mg) + $TMSN_3$ (126.5 mg) + PS-$DABCOF_2$ (20 mg) + DOWEX-H wet (25 mg) + sodium sulphate/potassium carbonate (2:1 mixture 100 mg) + washing AcOEt (2682 mg) – product mass (150 mg)/ product mass (159 mg) = 19.5.

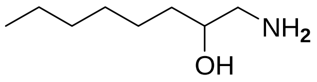
Batch experimental procedure for the Pd/Al_2O_3 reduction of *O*-TMS protected 1,2-azido alchols 3a, 3c and 3f to 1,2-amino alcohols 5a, 5c and 5f.



5a



5c



5f

1-Amino-3-phenoxy-2-propanol (5a)[6]

In a screw capped vial equipped with a magnetic stirrer, *O*-TMS-protected 1,2-azidoalcohol **3a** (0.265 g, 1.0 mmol), AcOEt (0.50 mL), Pd/Al_2O_3 (0.106 g, 0.05 mmol, 5% wt. Pd) and formic acid (0.038 mL, 1.0 mmol) were consecutively added and the resulting reaction mixture was left under stirring at 30 °C. After 18 h the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give pure 1-amino-3-phenoxy-2-propanol (**5a**) (0.164 g, 98% yield), as a colourless oil.

E-Factor: *O*-TMS-protected 1,2-azidoalcohol **3a** (265 mg) + Pd/Al_2O_3 (106 mg) + formic acid (46.36 mg) + washing AcOEt (1341mg) – product mass (164 mg)/ product mass (164 mg) = 9.8

trans-2-Amino-1-cyclohexanol (5c)[7]

In a screw capped vial equipped with a magnetic stirrer, *O*-TMS-protected 1,2-azidoalcohol **3c** (0,213 g, 1.0 mmol), AcOEt (0.50 mL) and Pd/Al_2O_3 (0.106 g, 0.05 mmol, 5% wt. Pd) and formic acid (0.038 mL, 1.0 mmol) were consecutively added and the resulting reaction mixture was left under stirring at 30 °C. After 18 h the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give pure *trans*-2-amino-1-cyclohexanol (**5c**) (0.115 g, 98% yield).

E-Factor: *O*-TMS-protected 1,2-azidoalcohol **3c** (213 mg) + Pd/Al_2O_3 (106 mg) + formic acid (46.36 mg) + washing AcOEt (1341mg) – product mass (115 mg)/ product mass (115 mg) = 13.8.

1-Amino-2-octanol (5f)[7]

In a screw capped vial equipped with a magnetic stirrer, *O*-TMS-protected 1,2-azidoalcohol **3f** (0.243 g, 1.0 mmol), AcOEt (0.50 mL) and Pd/Al_2O_3 (0.106 g, 0.05 mmol, 5% wt. Pd) and formic acid (0.038 mL, 1.0 mmol) were consecutively added and the reaction mixture was left under stirring at 30 °C. After 18 h the catalyst was filtered off and washed with AcOEt (1.0 mL). The collected organic phase were evaporated under vacuum to give pure 1-amino-2-octanol (**5f**) (0.145 g, 98% yield), as a colourless oil.

E-Factor: *O*-TMS-protected 1,2-azidoalcohol **3f** (243 mg) + Pd/Al_2O_3 (106 mg) + formic acid (46.36 mg) + washing AcOEt (1341mg) – product mass (145 mg)/ product mass (145 mg) = 11.0.

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