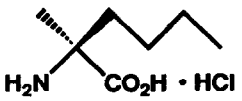
Tetrahedron: Asymmetry **1993,** *4*, 1081

M. Yokoyama, T. Sugai, and H. Ohta



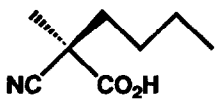
$C_7H_{16}ClNO_2$

(*S*)–α–Methylnorleucine hydrochloride

E.e. = >99% (by chiral HPLC of *N*–Cbz–*O*–Me deriv.)
$[\alpha]^{23}_D$ +10 (c 2.0, 5*N* HCl)
Source of chirality: Methyl (*R*)–2–carbamoyl–2–methylhexanoate
Absolute configuration: 2*S*
(assigned by optical rotatory dispersion)

Tetrahedron: Asymmetry **1993,** *4*, 1081

M. Yokoyama, T. Sugai, and H. Ohta



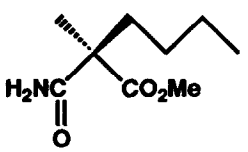
$C_8H_{13}NO_2$

(*R*)–2–Cyano–2–methylhexanoic acid

E.e. = 96% (by chiral HPLC of β–naphthyl ester)
$[\alpha]^{19}_D$ +8.6 (c 2.0, MeOH)
Source of chirality: Methyl (*R*)–2–carbamoyl–2–methylhexanoate
Absolute configuration: 2*R*

Tetrahedron: Asymmetry **1993,** *4*, 1081

M. Yokoyama, T. Sugai, and H. Ohta



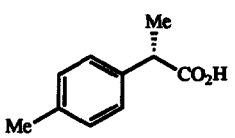
$C_9H_{17}NO_3$

Methyl (*R*)–2–carbamoyl–2–methylhexanoate

E.e. = 96%
$[\alpha]^{20}_D$ –15.6 (c 1.0, $CHCl_3$)
Source of chirality: enzymatic hydrolysis of prochiral dinitrile
Absolute configuration: 2*R*
(assigned *via* chemical correlation)

Tetrahedron: Asymmetry **1993,** *4*, 1085

T. Beard, M.A. Cohen, J.S. Parratt, N.J. Turner, J. Crosby, and J. Moilliet



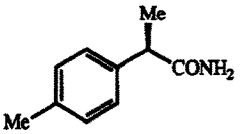
$C_{10}H_{12}O_2$

(*S*)-2-(4'-methylphenyl)-propionic acid

E.e. = >95%
$[\alpha]_D^{25}$ = +57.0 (c = 1.0, $CHCl_3$)
Source of chirality: enzyme nitrile hydrolysis
Absolute configuration: 2*S*

T. Beard, M.A. Cohen, J.S. Parratt, N.J. Turner, J. Crosby, and J. Moilliet

Tetrahedron: Asymmetry **1993,** *4*, 1085



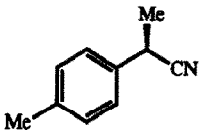
$C_{10}H_{13}NO$

(*R*)-2-(4'-methylphenyl)-propionamide

E.e. = >95%
$[\alpha]_D^{25}$ = -49.7 (c = 1.14, $CHCl_3$)
Source of chirality: enzyme nitrile hydrolysis
Absolute configuration: 2*R*

T. Beard, M.A. Cohen, J.S. Parratt, N.J. Turner, J. Crosby, and J. Moilliet

Tetrahedron: Asymmetry **1993,** *4*, 1085



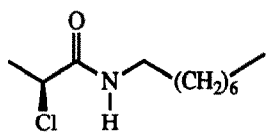
$C_{10}H_{11}N$

(*R*)-2-(4'-methylphenyl)-propionitrile

E.e. = >95%
$[\alpha]_D^{25}$ = +13.1 (c = 1.1, $CHCl_3$)
Source of chirality: enzyme nitrile hydrolysis
Absolute configuration: 2*R*

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



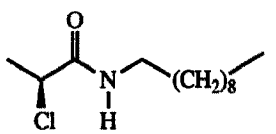
$C_{11}H_{22}ClNO$

(*S*)-2-Chloro-*N*-octylpropanamide

E.e. 70% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -10.0 (c 0.97, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



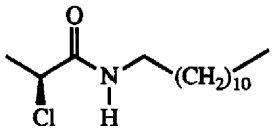
$C_{13}H_{26}ClNO$

(*S*)-2-Chloro-*N*-decylpropanamide

E.e. 92% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -9.9 (c 1.02, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



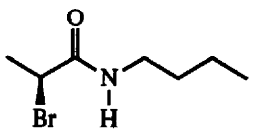
$C_{15}H_{30}ClNO$

(*S*)-2-Chloro-*N*-dodecylpropanamide

E.e. 51% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -5.7 (c 1.02, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



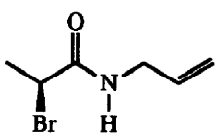
$C_7H_{14}BrNO$

(*S*)-2-Bromo-*N*-butylpropanamide

E.e. 90% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -10.2 (c 0.80, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



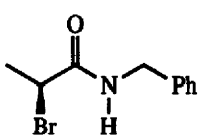
$C_6H_{10}BrNO$

(*S*)-*N*-Allyl-2-bromopropanamide

E.e. 50% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -3.8 (c 0.82, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



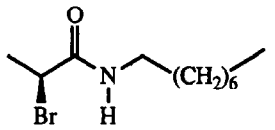
$C_{10}H_{12}BrNO$

(*S*)-*N*-Benzyl-2-bromopropanamide

E.e. <5% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -0.5 (c 0.70, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



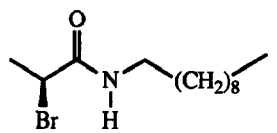
$C_{11}H_{22}BrNO$

(*S*)-2-Bromo-*N*-octylpropanamide

E.e. 61% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -6.0 (c 0.72, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



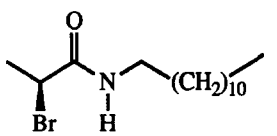
$C_{13}H_{26}BrNO$

(*S*)-2-Bromo-*N*-decylpropanamide

E.e. 64% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -6.5 (c 0.65, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



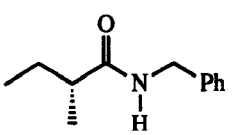
$C_{15}H_{30}BrNO$

(*S*)-2-Bromo-*N*-dodecylpropanamide

E.e. 64% [by 1H-NMR spectroscopy using the chiral shift reagent tris[3-(trifluoromethylhydroxymethylene)-(+)--camphorato]europium (III).]
$[\alpha]_D^{25}$= -3.6 (c 0.60, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: S

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



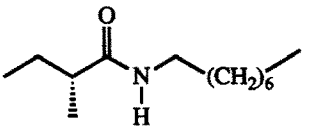
$C_{12}H_{17}NO$

(*R*)-*N*-Benzyl-2-methylbutanamide

E.e. 78% [by comparison with an authentical sample obtained from (S)-(+)-2-methylbutyric anhydride]
$[\alpha]_D^{25}$= -6.8 (c 1.05, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: R

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



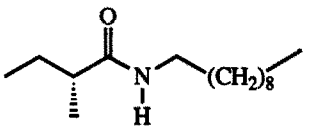
$C_{13}H_{27}NO$

(*R*)-2-Methyl-*N*-octylbutanamide

E.e. 50% [by comparison with an authentical sample obtained from (S)-(+)-2-methylbutyric anhydride]
$[\alpha]_D^{25}$= -6.0 (c 0.99, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: R

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



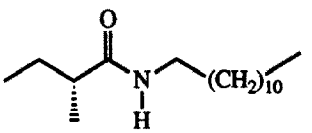
$C_{15}H_{31}NO$

(*R*)-*N*-Decyl-2-methylbutanamide

E.e. 50% [by comparison with an authentical sample obtained from (S)-(+)-2-methylbutyric anhydride]
$[\alpha]_D^{25}$= -3.7 (c 0.96, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: R

M. Quirós, V. M. Sánchez, R. Brieva, F. Rebolledo and V. Gotor

Tetrahedron: Asymmetry **1993,** *4*, 1105



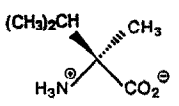
$C_{17}H_{35}NO$

(*R*)-*N*-Dodecyl-2-methylbutanamide

E.e. 48% [by comparison with an authentical sample obtained from (S)-(+)-2-methylbutyric anhydride]
$[\alpha]_D^{25}$= -4.6 (c 0.70, $CHCl_3$)
Source of chirality: Enzymatic aminolysis
Absolute configuration: R

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



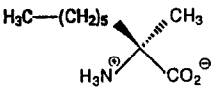
$C_6H_{13}NO_2$

2-Amino-2,3-dimethylbutanoic acid

E.e.>98% [by NMR using S-2-chloropropionyl chloride]
$[\alpha]_D^{20}$=-4.0 (c1.3,H_2O) HCl-salt, S-enantiomer
Sourse of chirality: enzymatic resolution

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



E.e.>99% [by HPLC]

$[\alpha]_D^{20}$=+13.3 (c1,1N HCl), S-enantiomer

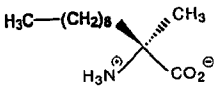
Sourse of chirality: enzymatic resolution

$C_9H_{19}NO_2$

2-Amino-2-methyloctanoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



E.e.>99% [by HPLC]

$[\alpha]_D^{20}$=+16.4 (c0.5,MeOH) HCl-salt, S-enantiomer

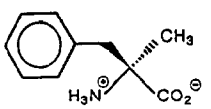
Sourse of chirality: enzymatic resolution

$C_{12}H_{25}NO_2$

2-Amino-2-methylundecanoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



E.e.>99% [by HPLC]

$[\alpha]_D^{20}$=-22.0 (c1,H_2O), HCl-salt, S-enantiomer

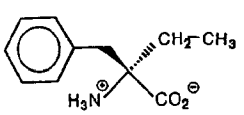
Sourse of chirality: enzymatic resolution

$C_{10}H_{13}NO_2$

2-Amino-2-methyl-3-phenylpropanoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



E.e.>96% [by HPLC]

$[\alpha]_D^{20}$=-22.8 (c1,H_2O), HCl-salt, S-enantiomer

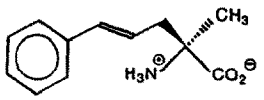
Sourse of chirality: enzymatic resolution

$C_{11}H_{15}NO_2$

2-Amino-2-ethyl-3-phenylpropanoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113



E.e.>98% [by HPLC]

$[\alpha]_D^{25}$=-1.8 (c1,1N HCl), S-enantiomer

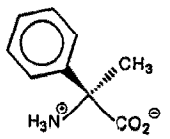
Sourse of chirality: enzymatic resolution

$C_{12}H_{15}NO_2$

2-Amino-2-methyl-5-phenylpent-4-enoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113



E.e.=95% [by HPLC]

$[\alpha]_D^{20}$=+86.0 (c1,1N HCl), S-enantiomer

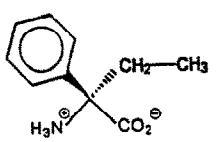
Sourse of chirality: enzymatic resolution

$C_9H_{11}NO_2$

2-Amino-2-methylphenylacetic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113



E.e.=94% [by HPLC]

$[\alpha]_D^{20}$=+37.6 (c1,1N HCl), S-enantiomer

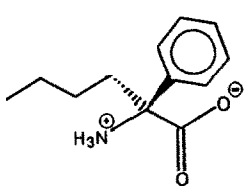
Sourse of chirality: enzymatic resolution

$C_{10}H_{13}NO_2$

2-Amino-2-ethylphenylacetic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113



E.e.=93% [by HPLC]

$[\alpha]_D^{20}$=+25.3 (c1,1N HCl) S(?)-enantiomer

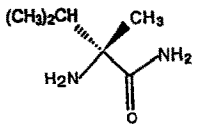
Sourse of chirality: enzymatic resolution

$C_{12}H_{17}NO_2$

2-Amino-2-phenylhexanoic acid

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113

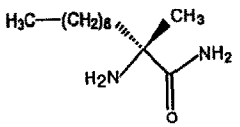


E.e.>98% [by NMR using S-2-chloropropionyl chloride]
$[\alpha]_D^{20}$=+27.5 (c1,H_2O) R-enantiomer
Sourse of chirality: enzymatic resolution

$C_6H_{13}N_2O$
2-Amino-2,3-dimethylbutanoic acid amide

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113

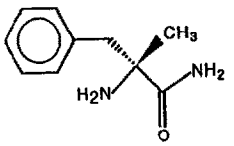


E.e.=99% [by HPLC]
$[\alpha]_D^{20}$=-12.6 (c1,1N HCl), R-enantiomer
Sourse of chirality: enzymatic resolution

$C_{12}H_{25}N_2O$
2-Amino-2-methylundecanoic acid amide

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113

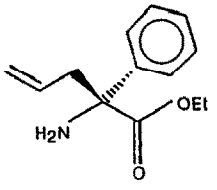


E.e.=99% [by HPLC]
$[\alpha]_D^{20}$=+42.0 (c1,MeOH), R-enantiomer
Sourse of chirality: enzymatic resolution

$C_{10}H_{13}N_2O$
2-Amino-2-methyl-3-phenylpropanoic acid amide

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993**, *4*, 1113

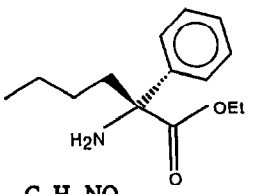


E.e.=95% [by HPLC]
$[\alpha]_D^{20}$=-7.8 (c1,1N HCl), R-enantiomer
Sourse of chirality: enzymatic resolution

$C_{13}H_{17}NO_2$
Ethyl 2-amino-2-phenylpent-4-enoate

B. Kaptein, W.H.J. Boesten, Q.B. Broxterman, P.J.H. Peters, H.E. Schoemaker and J. Kamphuis.

Tetrahedron: Asymmetry **1993,** *4*, 1113



$C_{14}H_{21}NO_2$

Ethyl 2-amino-2-phenylhexanoate

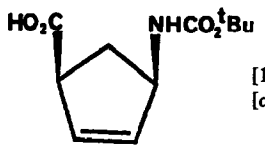
E.e.=97% [by HPLC]

$[\alpha]_D^{20}$=-7.7 (c1,1N HCl), R(?)-enantiomer

Sourse of chirality: enzymatic resolution

Tetrahedron: Asymmetry **1993,** *4*, 1117

S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans

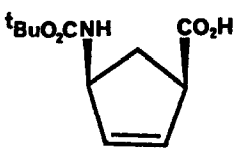


[1(R), 4(S)]-N-(tert-Butoxycarbonyl)-4-amino-2-cyclopentene-1-carboxylic acid

$[\alpha]_D^{25}$ + 40.3 (c = 2.1, CH_2Cl_2)

Tetrahedron: Asymmetry **1993,** *4*, 1117

S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans

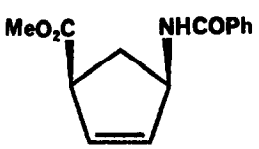


[1(S), 4(R)]-N-(tert-Butoxycarbonyl)-4-amino-2-cyclopentene-1-carboxylic acid

$[\alpha]_D^{25}$ - 40.3 (c = 2.1, CH_2Cl_2)

Tetrahedron: Asymmetry **1993,** *4*, 1117

S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans



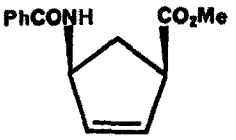
[1(R), 4(S)]-4-benzoylamino-2-cyclopentene-1-carboxylic acid, methyl ester

m.p. 80.5-82°C

$[\alpha]_D^{25}$ - 33.6 (c = 2.2, CH_2Cl_2)

Tetrahedron: Asymmetry **1993,** *4*, 1117

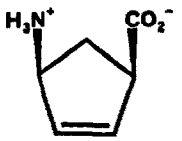
S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans



[1(S), 4 (R)]-4-benzoylamino-2-cyclopentene-1-carboxylic acid, methyl ester
m.p. 80.5-82°C
$[\alpha]_D^{25}$ + 33.6 (c = 2.2, CH_2Cl_2)

Tetrahedron: Asymmetry **1993,** *4*, 1117

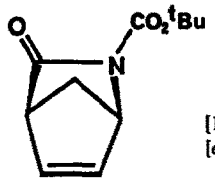
S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans



[1(R), 4 (S)]-4-Amino-2-cyclopentene-1-carboxylic acid
$[\alpha]_D$ + 242 (c = 2, H_2O)

Tetrahedron: Asymmetry **1993,** *4*, 1117

S. J. C. Taylor, R. McCague, R. Wisdom, C. Lee, K. Dickson, G. Ruecroft, F. O'Brien, J. Littlechild, J. Bevan, S. M. Roberts and C. T. Evans

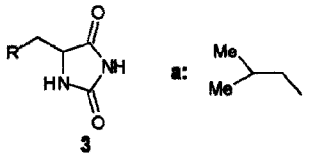


[1(R), 4(S)]-N- (tert-Butoxycarbonyl)-2-azabicyclo[2.2.1]hept-5-en-3-one
$[\alpha]_D$ - 189 (c = 0.89, CH_2Cl_2)

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

Tetrahedron: Asymmetry **1993,** *4*, 1129

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]



3

$C_3H_3N_2O_2$

5-Isobutyl-imidazolidin-2,4-dione

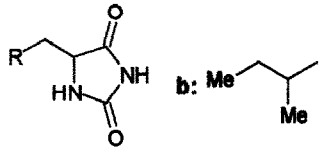
E. e > 98 %

Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

Tetrahedron: Asymmetry **1993,** *4*, 1129

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]



3

$C_3H_3N_2O_2$

5-(1)-Methyl-propyl-imidazolidin-2,4-dione

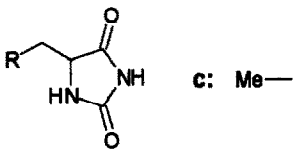
E. e > 98 %

Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : 2R, 3R or 2S, 3S

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

Tetrahedron: Asymmetry **1993,** *4*, 1129

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]



3

$C_4H_4N_2O_2$

5-methyl-imidazolidin-2,4-dione

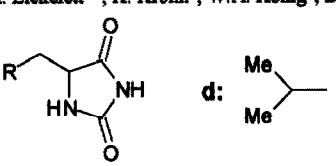
E. e > 98 %

Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

Tetrahedron: Asymmetry **1993,** *4*, 1129

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]



3

$C_4H_4N_2O_2$

5-Isopropyl-imidazolidin-2,4-dione

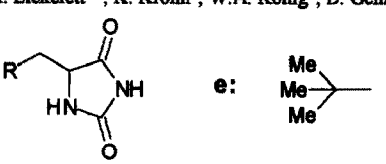
E. e > 98 %

Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

Tetrahedron: Asymmetry **1993,** *4*, 1129

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]



3

$C_4H_4N_2O_2$

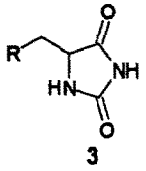
5-tert-butyl-imidazolidin-2,4-dione

E. e > 98 %
$[\alpha]_D^{20}$ +63.9 (c = 0.27, ethanol)
Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]

Tetrahedron: Asymmetry **1993**, *4*, 1129



f:

3

$C_3H_1N_2O_2$

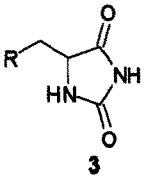
5-Cyclohexyl-methyl-imidazolidin-2,4-dione

E. e > 98 %
$[\alpha]_D^{20}$ +62.4 (c = 1.27, ethanol)
Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

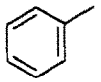
Enantioseparation of 5-Monosubstituted Hydantoins by Capillary Gas Chromatography - Investigation of Chemical and Enzymatic Racemization

H. Lickefett*[1], K. Krohn[2], W.A. König[3], B. Gehrcke[3] and C. Syldatk[1]

Tetrahedron: Asymmetry **1993**, *4*, 1129



g:



3

$C_3H_1N_2O_2$

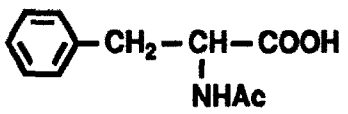
5-Phenyl-imidazolidin-2,4-dione

E. e > 98 %

Source of chirality : Chemical synthesis from the corresponding D- or L-α- amino acid
Absolute configuration : R or S

Tetrahedron: Asymmetry **1993**, *4*, 1137

R. Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



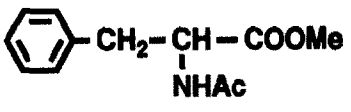
$C_{11}H_{13}NO_3$

N-acetyl-phenylalanine

E.e. > 95% (^{1}H NMR of (S)-naphthylethylamide)
$[\alpha]_D^{23}$ = - 51.0 (c 4, EtOH)
Source of chirality : enzymatic hydrolysis
Absolute configuration : D

Tetrahedron: Asymmetry **1993**, *4*, 1137

R. Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



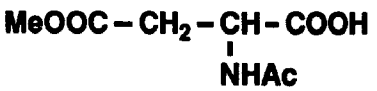
$C_{12}H_{15}NO_3$

Methyl N-acetyl-phenylalaninate

E.e > 95% (optical rotation)
$[\alpha]_D^{23}$ = +19.3 (c 3, MeOH)
Source of chirality : enzymatic hydrolysis
Absolute configuration : L

Tetrahedron: Asymmetry **1993**, *4*, 1137

R. Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



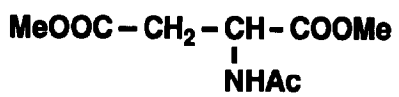
$C_7H_{11}NO_5$

B-methyl N-acetyl-aspartate

E.e > 95% (^{1}H NMR of (S)-1-naphthylethylamide)
$[\alpha]_D^{23}$ = -8.3 (c 3, EtOH)
Source of chirality : enzymatic hydrolysis
Absolute configuration : D

Tetrahedron: Asymmetry **1993**, *4*, 1137

R.Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



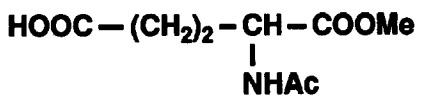
$C_7H_{11}NO_5$

Dimethyl N-acetyl-aspartate

E.e > 95% (optical rotation)
$[\alpha]_D^{23}$ = -21.0 (c 1, $CHCl_3$)
Source of chirality : enzymatic hydrolysis
Absolute configuration : L

Tetrahedron: Asymmetry **1993**, *4*, 1137

R. Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



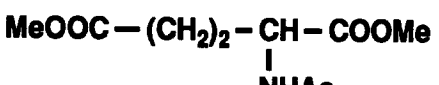
$C_8H_{13}NO_5$

α-methyl N-acetyl-glutamate

E.e > 95% (^{1}H NMR of (S)-1-naphthylethylamide)
$[\alpha]_D^{23}$ = +23.0 (c 4, MeOH)
Source of chirality : enzymatic hydrolysis
Absolute configuration : D

Tetrahedron: Asymmetry **1993**, *4*, 1137

R. Chênevert, R. BelRhlid, M. Létourneau, R. Gagnon, L. D'Astous.



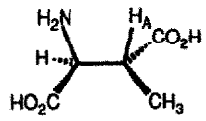
$C_9H_{15}NO_5$

Dimethyl N-acetyl-glutamate

E.e > 95% (optical rotation)
$[\alpha]_D^{23}$ = +12.2 (c 3, MeOH)
Source of chirality : enzymatic hydrolysis
Absolute configuration : L

Catherine H. Archer, Neil R. Thomas and David Gani

Tetrahedron: Asymmetry **1993**, *4*, 1141



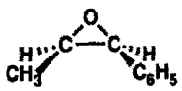
$C_5H_9NO_4$

3-Methylaspartic acid

D.e. 95% (asymmetric alkylation) or
98% (enzymic amination then resolution
100% (2*S*)-configuration)
H_A = H; $[\alpha]_D$ +36.3 (c 1.0, 5M HCl)
H_A = ^2H; $[\alpha]_D$ +30.5 (c 1.0, 5 M HCl)
Source of chirality: asymm. synth. or enzyme
Absolute configuration 2S,3R

G. Bellucci, C. Chiappe, A. Cordoni and F. Marioni

Tetrahedron: Asymmetry **1993**, *4*, 1153



$C_9H_{10}O$

cis-1-Phenylpropene oxide

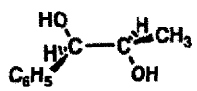
E.e. >98% [by glc: Chiraldex G-TA]

Source of chirality: enzymatic hydrolysis of the racemate

Absolute configuration (1S,2R)

G. Bellucci, C. Chiappe, A. Cordoni and F. Marioni

Tetrahedron: Asymmetry **1993**, *4*, 1153



$C_9H_{12}O_2$

threo-1-Phenylpropane-1,2-diol

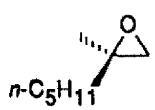
E.e. >98% [by glc: Chiraldex G-TA]

Source of chirality: enzymatic hydrolysis of (±)-cis-1-phenylpropene oxide

Absolute configuration (1R,2R)

P. Hechtberger, G. Wirnsberger, M. Mischitz, N. Klempier, K. Faber*

Tetrahedron: Asymmetry **1993**, *4*, 1161

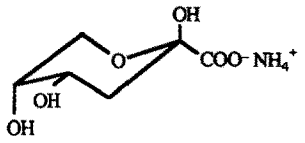


$C_8H_{16}O$
2-Methyl-2-pentyloxiran

E.e. = 72% [by chiral GC]
$[\alpha]_D^{20}$ = -6.82 (c 3.43, $CHCl_3$)
Source of chirality: enzymatic resolution.
Absolute configuration: (*R*) by comparison with independently synthesized material.

Claudine Augé and Véronique Delest

Tetrahedron: Asymmetry **1993,** *4*, 1165



$C_6H_{13}O_6N$

D.e. = 92% (by ^1H and ^{13}C NMR)

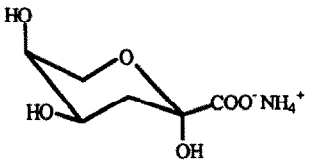
$[\alpha]_D^{20} = -26$ (c, 2, water)

Source of chirality: microbiological aldolisation

Absolute configuration 4S, 5R

Claudine Augé and Véronique Delest

Tetrahedron: Asymmetry **1993,** *4*, 1165



$C_6H_{13}O_6N$

Diastereomeric mixture (by ^1H and ^{13}C NMR):

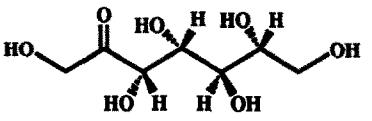
60:40 4R, 5S:4S, 5S

$[\alpha]_D^{20} = +7.9$ (c, 1.25 , water)

Source of chirality: microbiological aldolisation

V. Dalmas and C. Demuynck

Tetrahedron: Asymmetry **1993,** *4*, 1169



$C_7H_{14}O_7$

D-Sedoheptulose (D-*altro*-heptulose)

$[\alpha]_J^{25} = +8$ (c = 0.03, H_2O)

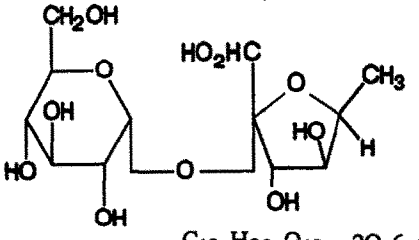
Source of chirality : Transketolase

Absolute configuration : 3S, 4R, 5R, 6R

(assigned on the basis of $[\alpha]_J^{25}$)

Tetrahedron: Asymmetry **1993,** *4*, 1173

J. Peters, H.P. Brockamp, T. Minuth, M. Grothus, A. Steigel, M.R. Kula, L. Elling

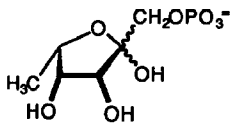


$C_{12}H_{22}O_{10}$ 2O-6-deoxy-α-L-sorbofuranosyl-D-glucose

Source of chirality: natural and enzymatic synthesis

W.-D. Fessner,* A. Schneider, O. Eyrisch, G. Sinerius, and J. Badía

Tetrahedron: Asymmetry **1993,** *4,* 1183



$C_6H_{11}O_8P$ x 2 ($C_6H_{14}N$)

6-Deoxy-L-lyxo-hexulose 1-phosphate, bis(cyclohexylammonium) salt

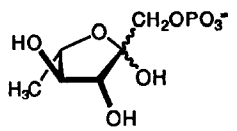
E.e. = 100%
$[\alpha]_D^{18}$ = +0.5 (c 2, H_2O)

Source of chirality: natural (from L-fucose) and enzymatic synthesis (aldol addition)

Absolute configuration 3R,4R,5S by relation to natural L-fucose

W.-D. Fessner,* A. Schneider, O. Eyrisch, G. Sinerius, and J. Badía

Tetrahedron: Asymmetry **1993,** *4,* 1183



$C_6H_{11}O_8P$ x 2 ($C_6H_{14}N$)

6-Deoxy-L-arabino-hexulose 1-phosphate, bis(cyclohexylammonium) salt

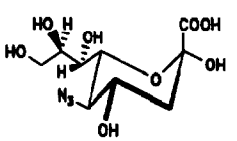
E.e. = 100%
$[\alpha]_D^{18}$ = +2 (c 1, H_2O)

Source of chirality: natural (from L-rhamnose) and enzymatic synthesis (aldol addition)

Absolute configuration 3R,4S,5S by relation to natural L-rhamnose

U. Kragl, A. Gödde, C. Wandrey, W. Kinzy, J.J. Cappon, J. Lugtenburg

Tetrahedron: Asymmetry **1993,** *4,* 1193



$[\alpha]_D^{20}$ = −62.2 (c = 0.66, H_2O)

Source of chirality: natural and enzymatic asymmetric aldol condensation

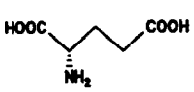
$C_9H_{15}N_3O_8$

5-Azido-3,5-dideoxy-D-*glycero*-D-*galacto*-nonulosonic acid

5-Azido-neuraminic acid

U. Kragl, A. Gödde, C. Wandrey, W. Kinzy, J.J. Cappon, J. Lugtenburg

Tetrahedron: Asymmetry **1993,** *4,* 1193



$C_5H_9NO_4$

^{15}N-L-Glutamic acid

E.e > 99.5 % [by HPLC]

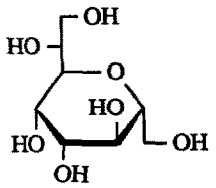
Source of chirality: enzymatic asymmetric reduction (reductive amination)

Absolute configuration: 2S

^{15}N content 98 %

F. Nicotra, L. Panza, G. Russo and A. Verani

Tetrahedron: Asymmetry **1993**, *4*, 1203



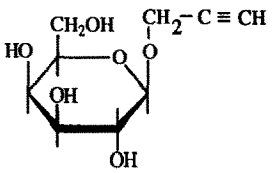
$C_8H_{16}O_7$

L-*allo*-D-*erythro*-3,7-anhydro-octitol

e.d. = about 100%
$[\alpha]_D$ = +6.6 (c 1, MeOH)
Source of chirality: D-ribose 5-phosphate
Absolute configuration: *2R,3S,4S,5S,6R,7R*
(assigned by ^{1}H NMR and reaction mechanism)

Alexander M. Blinkovsky and Jonathan S. Dordick

Tetrahedron: Asymmetry **1993**, *4*, 1221



$C_6H_{14}O_6$

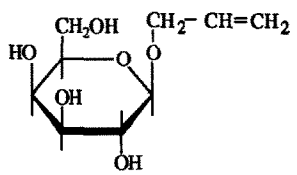
Propargyl-β-D-Galactopyranoside

$[\alpha]_D^{25}$ = -39.8 (c1.8, H_2O)

Source of chirality: enzymatic synthesis from lactose

Alexander M. Blinkovsky and Jonathan S. Dordick

Tetrahedron: Asymmetry **1993**, *4*, 1221



$C_9H_{16}O_6$

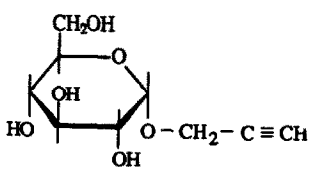
Allyl-β-D-Galactopyranoside

$[\alpha]_D^{25}$ = -11.2 (c2, H_2O)

Source of chirality: enzymatic synthesis from lactose

Alexander M. Blinkovsky and Jonathan S. Dordick

Tetrahedron: Asymmetry **1993**, *4*, 1221



$C_9H_{14}O_6$

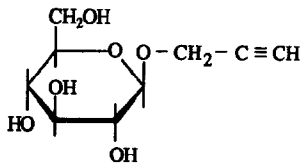
Propargyl-α-D-glucopyranoside

$[\alpha]_D^{25}$ = +95.9 (c1.8, H_2O)

Source of chirality: enzymatic synthesis from maltose

Alexander M. BLinkovsky and Jonathan S. Dordick

Tetrahedron: Asymmetry **1993,** *4*, 1221



$[\alpha]_D^{25}$ = -54.5 (c1.8, H_2O)

$C_9H_{14}O_6$

Source of chirality: enzymatic synthesis from cellobiose

Propargyl-β-D-Glucopyranoside

M. Hamdani, B. De Jeso, H. Deleuze,

A. Saux and B. Maillard.

Tetrahedron: Asymmetry **1993,** *4*, 1233

CH_3-CH(OH)-CHCl-$CO_2C_2H_5$

Sources of chirality :

- Reduction of the corresponding ketoester by baker's yeast
  d.e. = 96% (2R,3S) e.e. = 96%
- D-Threonine
  d.e. > 98% (2R,3S) e.e. > 96%

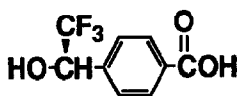
$C_6H_{11}O_3Cl$

Ethyl 2-chloro-3-hydroxybutanoate

$[\alpha]_D^{25}$ = + 12.4 (c = 1 , $CHCl_3$)

Tetrahedron: Asymmetry **1993,** *4*, 1237

T. Fujisawa,* K. Ichikawa, and M. Shimizu



$C_9H_7O_3F_3$

ee = >99% (after recrystallization from toluene) [determined by GLC analysis of the corresponding MTPA ester]

$[\alpha]_D^{23}$ -28.1 (c 0.08, MeOH)

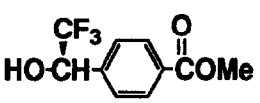
Source of chirality: Bakers' yeast reduction

Absolute configuration: *R* (assigned by comparison with the authentic sample prepared from the known (*R*)-*p*-(2,2,2-trifluoro-1-hydroxyethyl)bromobenzene)

(*R*)-*p*-(2,2,2-Trifluoro-1-hydroxyethyl)benzoic Acid

Tetrahedron: Asymmetry **1993,** *4*, 1237

T. Fujisawa,* K. Ichikawa, and M. Shimizu



$C_{10}H_9O_3F_3$

ee = >99% (after recrystallization from n-hexane) [determined by GLC analysis of the corresponding MTPA ester]

$[\alpha]_D^{23}$ -28.3 (c 0.12, MeOH)

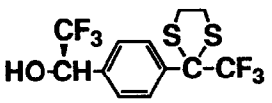
Source of chirality: Bakers' yeast reduction

Absolute configuration: *R* (assigned by comparison with the authentic sample prepared from the known (*R*)-*p*-(2,2,2-trifluoro-1-hydroxyethyl)bromobenzene)

Methyl (*R*)-*p*-(2,2,2-Trifluoro-1-hydroxyethyl)benzoate

Tetrahedron: Asymmetry **1993,** *4*, 1237

T. Fujisawa,* K. Ichikawa, and M. Shimizu



$C_{12}H_{10}OS_2F_6$

ee = >99% (after recrystallization from toluene) [determined by HPLC analysis of the corresponding MTPA ester]

$[\alpha]_D^{23}$ -21.0 (c 0.20, MeOH)

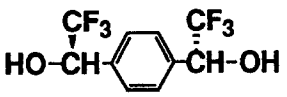
Source of chirality: Bakers' yeast reduction

Absolute configuration: *R* (assigned by comparison with the authentic sample prepared from the known (*R*)-*p*-(2,2,2-trifluoro-1-hydroxyethyl)bromobenzene)

(*R*)-4-(2,2,2-Trifluoro-1-hydroxyethyl)-1-(2-trifluoromethyl-1,3-dithiolan-2-yl)benzene

Tetrahedron: Asymmetry **1993,** *4*, 1237

T. Fujisawa,* K. Ichikawa, and M. Shimizu



$C_{10}H_8O_2F_6$

ee = >99% (after recrystallization from carbon tetrachloride) [determined by GLC analysis of the corresponding MTPA ester]

$[\alpha]_D^{23}$ -48.0 (c 0.10, MeOH)

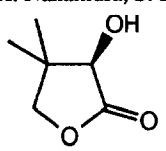
Source of chirality: Bakers' yeast reduction

Absolute configuration: *R,R* (assigned by comparison with the authentic sample prepared from the known (*R*)-*p*-(2,2,2-trifluoro-1-hydroxyethyl)bromobenzene)

(*R,R*)-*p*-Bis(2,2,2-trifluoro-1-hydroxyethyl)benzene

Tetrahedron: Asymmetry **1993,** *4*, 1253

K. Nakamura, S. Kondo, Y. Kawai, and A. Ohno



$C_6H_{10}O_3$

(*R*)–(-)–Pantolactone
(*R*)–Dihydro-3-hydroxy-4,4-dimethyl-2(3*H*)–furanone

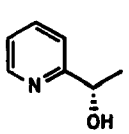
E.e. = 93% [by chiral HPLC analysis of corresponding 3,5-dinitrobenzoyl ester]

Source of chirality : Microbial reduction

Absolute configuration : *R*

Tetrahedron: Asymmetry **1993,** *4*, 1255

D. Bailey, D. O'Hagan, U. Dyer and R. B. Lamont



C_7H_9NO
2-α-ethanolpyridine

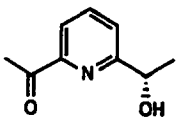
E.e. = >95 [by n m r of acetate withEu(hfc)$_3$]
$[\alpha]_D^{20}$ = -29.14 (c4.94, $CHCl_3$)

Source of chirality: Bakers' yeast reduction

Absolute configuration (S)

D. Bailey, D. O'Hagan, U. Dyer and R. B. Lamont

Tetrahedron: Asymmetry **1993**, *4*, 1255



E.e. = 99.8 [chiral HPLC analysis]
$[\alpha]_D^{20}$ = -7.5 (c1.5, $CHCl_3$)

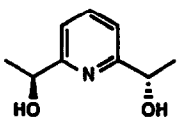
Source of chirality: Bakers' yeast reduction

Absolute configuration (S)

$C_9H_{11}NO_2$
2-Acetyl-6-α-ethanolpyridine

D. Bailey, D. O'Hagan, U. Dyer and R. B. Lamont

Tetrahedron: Asymmetry **1993**, *4*, 1255



E.e. = 99.97 [chiral HPLC analysis]
$[\alpha]_D^{20}$ = -26.84 (c2.98, $CHCl_3$)

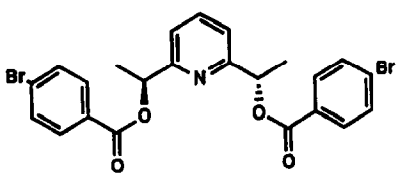
Source of chirality: Bakers' yeast reduction

Absolute configuration (S,S)
(assigned by X-ray of di-*p*-bromobenzoate)

$C_9H_{13}NO_2$
2,6-di-α-ethanolpyridine

D. Bailey, D. O'Hagan, U. Dyer and R. B. Lamont

Tetrahedron: Asymmetry **1993**, *4*, 1255



E.e. = 99.97 [chiral HPLC analysis]
$[\alpha]_D^{20}$ =+70.18 (c1.71, $CHCl_3$)
mp 154-154.5°C

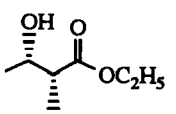
Source of chirality: Bakers' yeast reduction

Absolute configuration (S,S)
(assigned by X-ray analysis)

$C_{23}H_{19}Br_2NO_4$
2,6-diethylpyridine di-α,α,-*p*-bromobenzoate

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259

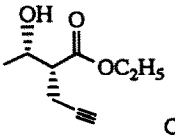


$C_7H_{14}O_3$
Ethyl 2-methyl-3-hydroxybutanoate

D.e. = 82% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = +6.15 (c 2.42, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2R,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



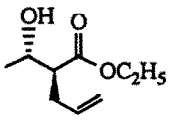
$C_9H_{14}O_3$

Ethyl 2-propargyl-3-hydroxybutanoate

D.e. = 52% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = +23.13 (c 2.35, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2R,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



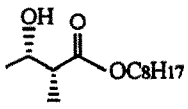
$C_9H_{16}O_3$

Ethyl 2-allyl-3-hydroxybutanoate

D.e. = 54% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = +12.61 (c 1.83, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2S,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



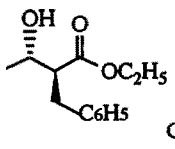
$C_{13}H_{26}O_3$

Octyl 2-methyl-3-hydroxybutanoate

D.e. = 92% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = +3.30 (c 3.18, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2R,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



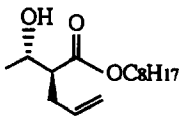
$C_{13}H_{18}O_3$

Ethyl 2-benzyl-3-hydroxybutanoate

D.e. = 40% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = -9.03 (c 2.9, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2S,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



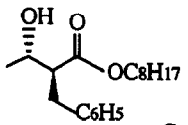
$C_{15}H_{28}O_3$

Octyl 2-allyl-3-hydroxybutanoate

D.e. = 20% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = +5.10 (c 1.88, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2S,3S

W.-R. Shieh and C. J. Sih*

Tetrahedron: Asymmetry **1993**, *4*, 1259



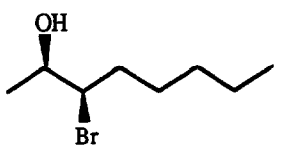
$C_{19}H_{30}O_3$

Octyl 2-benzyl-3-hydroxybutanoate

D.e. = 88% [by GC]
E.e. = 98% [by HPLC analysis of the Mosher's ester]
$[\alpha]_D^{23}$ = -24.31 (c 0.54, $CHCl_3$)
Source of chirality: yeast reduction
Absolute configuration: 2S,3S

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993**, *4*, 1271

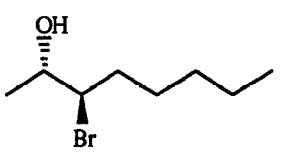


$C_8H_{17}BrO$
(2R,3R)-3-bromo-2-octanol

E.e. > 98 % (by GC analysis of esters obtained with (+)-(S)-O-acetyllactic acid chloride)
$[\alpha]_J^{25}$ = + 38 (c = 0.02, $CHCl_3$)
Source of chirality : Microbiological reduction
Absolute configuration : 2R, 3R
(assigned by chemical correlation)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993**, *4*, 1271

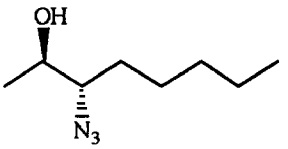


$C_8H_{17}BrO$
(2S,3R)-3-bromo-2-octanol

E.e. > 98 % (by GC analysis of esters obtained with (+)-(S)-O-acetyllactic acid chloride)
$[\alpha]_J^{25}$ = + 40 (c = 0.02, $CHCl_3$)
Source of chirality : Microbiological reduction
Absolute configuration : 2S, 3R
(assigned by chemical correlation)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

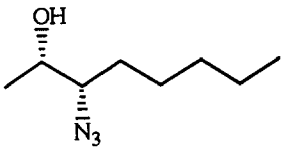


$C_8H_{17}N_3O$
(2R,3S)-3-azido-2-octanol

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = - 8 (c = 0.01, $CHCl_3$)
Source of chirality : Microbiological reduction
Absolute configuration : 2R, 3S
(assigned by chemical correlation)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

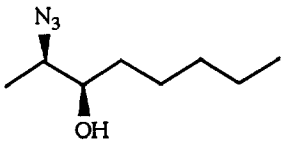


$C_8H_{17}N_3O$
(2S,3S)-3-azido-2-octanol

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = + 21 (c = 0.03, $CHCl_3$)
Source of chirality : Microbiological reduction
Absolute configuration : 2S, 3S
(assigned by chemical correlation)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

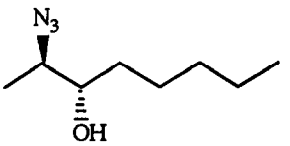


$C_8H_{17}N_3O$
(2R,3R)-2-azido-3-octanol

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = - 50 (c = 0.03, $CHCl_3$)
Source of chirality : from a precursor obtained by microbiological reduction
Absolute configuration : 2R, 3R
(assigned based on the reaction mechanism)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

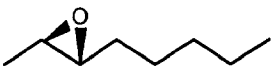


$C_8H_{17}N_3O$
(2R,3S)-2-azido-3-octanol

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = - 51 (c = 0.02, $CHCl_3$)
Source of chirality : from a precursor obtained by microbiological reduction
Absolute configuration : 2R, 3S
(assigned based on the reaction mechanism)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

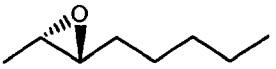


$C_8H_{16}O$
(2R,3S)-2,3-epoxyoctane

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = - 8 (c = 0.04, Pentane)
Source of chirality : from a precursor obtained by microbiological reduction
Absolute configuration : 2R, 3S
(assigned based on the reaction mechanism)

P. Besse and H. Veschambre

Tetrahedron: Asymmetry **1993,** *4*, 1271

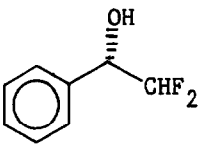


$C_8H_{16}O$
(2S,3S)-2,3-epoxyoctane

E.e. > 98 % (by GC analysis with chiral column : Lipodex E)
$[\alpha]_J^{25}$ = + 5 (c = 0.03, Pentane)
Source of chirality : from a precursor obtained by microbiological reduction
Absolute configuration : 2S, 3S
(assigned based on the reaction mechanism)

Y. Yamazaki and H. Kobayashi

Tetrahedron: Asymmetry **1993,** *4*, 1287



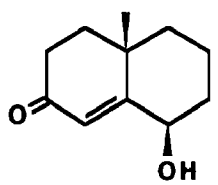
$C_8H_8F_2O$

α-(Difluoromethyl)benzyl alcohol

E.e. = 97 % (by HPLC)
$[\alpha]_D^{27}$ = + 19 (c = 2.8, CH_2Cl_2)
Source of chirality : enzymic reduction
Absolute configuration: S

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993,** *4*, 1295

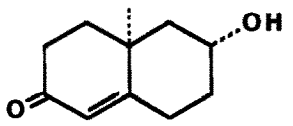


$C_{11}H_{16}O_2$
4a-methyl-8-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 95% (from e.e. of the precursor)
$[\alpha]_D^{21}$ = + 96.5 (c 1.025, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (S)-naphthalenone
Absolute configuration: 4aS,8R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993**, *4*, 1295

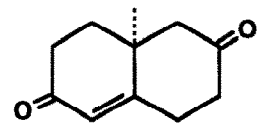


$C_{10}H_{15}O_2$
4a-methyl-6-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 95% (from e.e. of the precursor)
$[\alpha]_D^{21}$= – 210 (c 1.025, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (R)-naphthalenone
Absolute configuration: 4aS,6R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993**, *4*, 1295

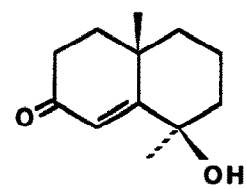


$C_{11}H_{14}O_2$
4a-methyl-4,4a,7,8-tetrahydro-naphthalene-2(3*H*), 6(5*H*)-dione

E.e. ≥ 95% (from e.e. of the precursor)
$[\alpha]_D^{21}$= -115 (c 0.3, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (R)-naphthalenone
Absolute configuration: 4aS

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993**, *4*, 1295

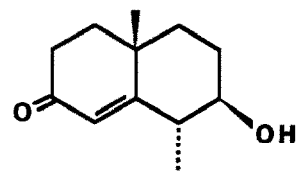


$C_{12}H_{18}O_2$
4a,8-dimethyl-8-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 95% (from e.e. of the precursor)
$[\alpha]_D^{21}$= + 71 (c 0.21, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (4aS,8S)-naphthalenone
Absolute configuration: 4aS,8R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993**, *4*, 1295

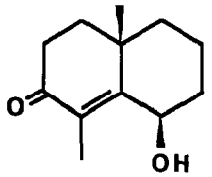


$C_{12}H_{18}O_2$
4a,8-dimethyl-7-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 95% (from e.e. of the precursor)
$[\alpha]_D^{21}$= + 62 (c 0.47, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (4aS,8S)-naphthalenone
Absolute configuration: 4aS,7R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993,** *4*, 1295

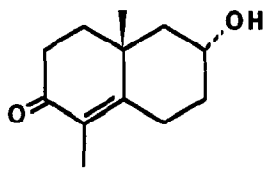


$C_{12}H_{18}O_2$
1,4a-dimethyl-8-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 90% (from e.e. of the precursor)
$[\alpha]_D^{21}$= +40 (c 3.7, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (S)-naphthalenone
Absolute configuration: 4aS,8R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993,** *4*, 1295

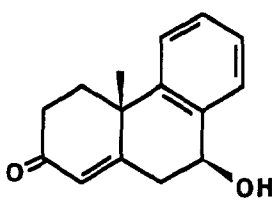


$C_{12}H_{18}O_2$
1,4a-dimethyl-6-hydroxy-4,4a,5,6,7,8-hexahydro-2(3*H*)-naphthalenone

E.e. ≥ 90% (from e.e. of the precursor)
$[\alpha]_D^{21}$= +164 (c 1.34, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (S)-naphthalenone
Absolute configuration: 4aR,6R (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993,** *4*, 1295

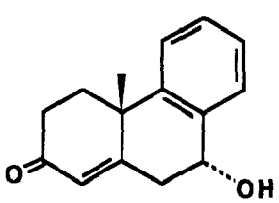


$C_{15}H_{16}O_2$
4a-methyl-9-hydroxy-4,4a,9,10-tetrahydro-2(3*H*)-phenanthrenone

E.e. ≥ 90% (from e.e. of the precursor)
$[\alpha]_D^{21}$= +208 (c 1.85, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (S)-phenanthrenone
Absolute configuration: 4aS,6S (relative configuration assigned by NMR)

A.Hammoumi, J.-P.Girault, R. Azerad, G.Revial and J. d'Angelo

Tetrahedron: Asymmetry **1993,** *4*, 1295

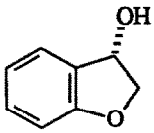


$C_{15}H_{16}O_2$
4a-methyl-9-hydroxy-4,4a,9,10-tetrahydro-2(3*H*)-phenanthrenone

E.e. ≥ 90% (from e.e. of the precursor)
$[\alpha]_D^{21}$= +105 (c 0.6, $CHCl_3$)
Source of chirality: microbial hydroxylation of the corresponding (S)-phenanthrenone
Absolute configuration: 4aS,6R (relative configuration assigned by NMR)

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima,and H.Dalton.

Tetrahedron: Asymmetry **1993**, *4*, 1307



$C_8H_8O_2$

3-Hydroxy-2,3-dihydrobenzofuran

E.e.= >98% [by CSP-HPLC analysis]

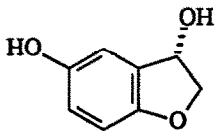
$[\alpha]_D$ =+67 (c 0.63 , $CHCl_3$)

Source of chirality : Resolution of the camphanate esters .

Absolute configuration : 3S
(Assigned by X-ray structure analysis of the camphanate ester)

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima andH.Dalton.

Tetrahedron: Asymmetry **1993**, *4*, 1307



$C_8H_8O_3$

3,5-Dihydroxy-2,3-dihydrobenzofuran

E.e.= > 98% [by CSP-HPLC analysis and by ^{1}H-NMR analysis of di-MTPA esters].

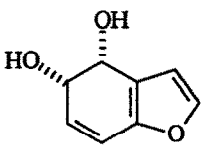
$[\alpha]_D$ =+22.5 , (c 0.67 ,MeOH)

Source of chirality : Biotransformation of enantiopure (+)-3-hydroxy-2,3-dihydrobenzofuran.

Absolute configuration : 3S
[Derived from (3S)-3-hydroxy-2,3-dihydrobenzofuran].

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima andH.Dalton.

Tetrahedron: Asymmetry **1993**, *4*, 1307



$C_8H_8O_3$

cis-4,5-Dihydroxy-4,5-dihydrobenzofuran

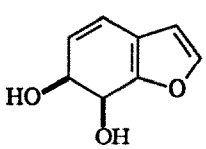
E.e.= >98% [by ^{1}H-NMR analysis of di-MTPA esters].

Source of chirality : Biotransformation of enantiopure (+)-3-hydroxy-2,3-dihydrobenzofuran.

Absolute configuration : 4R,5S
[Assigned by stereochemical correlation]

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima andH.Dalton.

Tetrahedron: Asymmetry **1993**, *4*, 1307



$C_8H_8O_3$

cis-6,7-Dihydroxy-6,7-dihydrobenzofuran

E.e.= >98% [by ^{1}H-NMR analysis of di-MTPA esters].

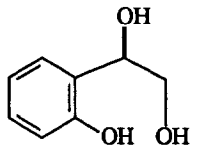
$[\alpha]_D$ = -35 (c 0.96, MeOH).

Source of chirality : Biotransformation of benzofuran

Absolute configuration : 6S,7S
[Assigned by stereochemical correlation]

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima,H.Dalton.

Tetrahedron: Asymmetry **1993,** *4*, 1307



$C_8H_{10}O_3$

1,2-Dihydroxy-1-(2'-hydroxyphenyl)ethane

E.e.= 51% (by $[\alpha]_D$ comparison)

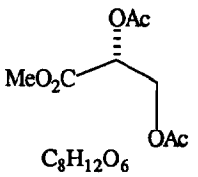
$[\alpha]_D$ = - 24 (c 0.76 , MeOH)

Source of chirality : Biotransformation of benzofuran.

Absolute configuration : 1R
[Assigned by stereochemical correlation with (2R)-methyl (2,3-diacetoxy)propanoate].

D.R.Boyd,N.D.Sharma,R.Boyle,J.F.Malone,J.Chima,H.Dalton.

Tetrahedron: Asymmetry **1993,** *4*, 1307



$C_8H_{12}O_6$

Methyl (2,3-diacetoxy)propanoate

E.e.= >98% (by synthesis from enantiopure(R)-glyceric acid.

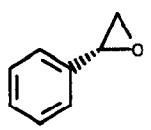
$[\alpha]_D$ = +15.8 (c 2.0 ,$CHCl_3$)

Source of chirality : Synthesis from enantiopure(R)- glyceric acid.

Absolute configuration : 2R
[Assigned by stereochemical correlation with(R)-glyceric acid].

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993,** *4*, 1325



C_8H_8O

Styrene oxide

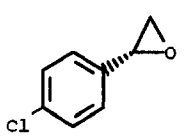
E.e.=49% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

Absolute configuration: R

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993,** *4*, 1325



C_8H_7ClO

4-Chlorostyrene oxide

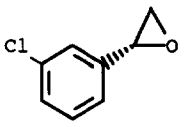
E.e.=66% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

Absolute configuration: R

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993**, *4*, 1325



E.e.=62% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

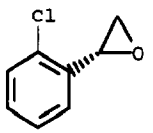
Absolute configuration: R

C_8H_7ClO

3-Chlorostyrene oxide

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993**, *4*, 1325



E.e.=64% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

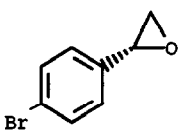
Absolute configuration: R

C_8H_7ClO

2-Chlorostyrene oxide

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993**, *4*, 1325



E.e.=68% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

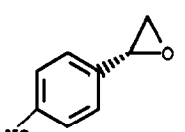
Absolute configuration: R

C_8H_7BrO

4-Bromostyrene oxide

S.Colonna, N.Gaggero, L.Casella, G.Carrea, P.Pasta

Tetrahedron: Asymmetry **1993**, *4*, 1325



E.e.=28% (by chiral HPLC with Chiralcel OB column)

Source of chirality: Chloroperoxidase

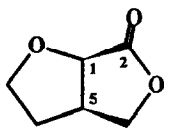
Absolute configuration: R

$C_8H_7NO_3$

4-Nitrostyrene oxide

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

3,8-dioxabicyclo[3.3.0]octan-2-one.

E.e. > 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 103.2 (c = 0.5, $CHCl_3$)

Source of chirality : enzymatic

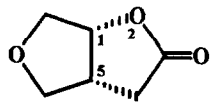
Baeyer-Villiger oxidation .

Absolute configuration : 1R,5S

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

2,7-dioxabicyclo[3.3.0]octan-3-one.

E.e. 97 % (by chiral GC)

$[\alpha]_D^{25}$ - 37 (c = 0.5, $CHCl_3$)

Source of chirality : enzymatic

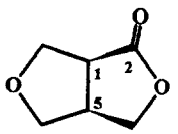
Baeyer-Villiger oxidation

Absolute configuration : 1R,5R

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

3,7-dioxabicyclo[3.3.0]octan-2-one.

E.e.> 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 101.2 (c = 0.5, $CHCl_3$)

Source of chirality : enzymatic

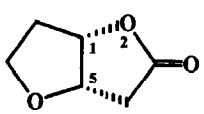
Baeyer-Villiger oxidation .

Absolute configuration : 1S,5R

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

2,6-dioxabicyclo[3.3.0]octan-3-one.

E.e.> 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 67.3 (c = 0.639, $CHCl_3$)

Source of chirality : enzymatic

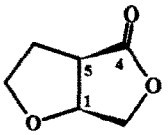
Baeyer-Villiger oxidation .

Absolute configuration : 1S,5S

(assigned by circular dichroism measurement)

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

3,8-dioxabicyclo[3.3.0]octan-4-one.

E.e.> 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 113.3 (c = 0.6, $CHCl_3$)

Source of chirality : enzymatic

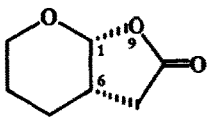
Baeyer-Villiger oxidation .

Absolute configuration : 1S,5R

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_7H_{10}O_3$

2,9-dioxabicyclo[4.3.0]nonan-8-one.

E.e. 70 % (by chiral GC)

$[\alpha]_D^{25}$ - 4 (c = 0.55, $CHCl_3$)

Source of chirality : enzymatic

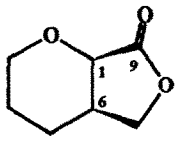
Baeyer-Villiger oxidation .

Absolute configuration : 1R,6S

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_7H_{10}O_3$

2,8-dioxabicyclo[4.3.0]nonan-9-one.

E.e. > 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 105.1 (c = 0.69, $CHCl_3$)

Source of chirality : enzymatic

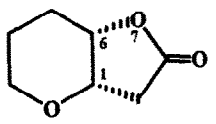
Baeyer-Villiger oxidation .

Absolute configuration : 1R,6S

(assigned by circular dichroism measurement).

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_7H_{10}O_3$

2,7-dioxabicyclo[3.3.0]nonan-8-one.

E.e. 33 % (by chiral GC)

$[\alpha]_D^{25}$ - 24 (c = 0.5, $CHCl_3$)

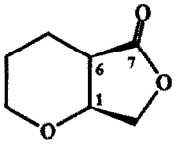
Source of chirality : enzymatic

Baeyer-Villiger oxidation .

Absolute configuration : 1S,6R

F. Petit and R. Furstoss

Tetrahedron: Asymmetry **1993,** *4*, 1341



$C_6H_8O_3$

2,8-dioxabicyclo[4.3.0]nonan-7-one.

E.e. > 98 % (by chiral GC)

$[\alpha]_D^{25}$ - 26.5 (c = 0.577, $CHCl_3$)

Source of chirality : enzymatic

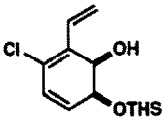
Baeyer-Villiger oxidation .

Absolute configuration : 1S,6R

(assigned by circular dichroism measurement).

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993,** *4*, 1365

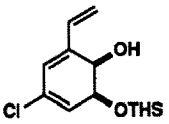


$[\alpha_D]$ = +101.1 (c 1.12, $CHCl_3$)
E.e. >98%

Obtained from *Pp*-39D oxidation of *o*-chlorostyrene and protection.
Absolute configuration established by convergent synthesis.

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993,** *4*, 1365

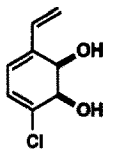


$[\alpha_D]$ = +82.9 (c 0.42, $CHCl_3$)
E.e. 54%

Obtained from *Pp*-39D oxidation of *m*-chlorostyrene and protection.
Absolute configuration established by convergent synthesis.

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993,** *4*, 1365

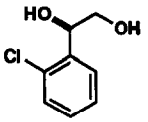


$[\alpha_D]$ = +12.4 (c 0.064, $CHCl_3$)
E.e. 15%

Obtained from *Pp*-39D oxidation of *p*-chlorostyrene.
Absolute configuration established by convergent synthesis.

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993**, *4*, 1365

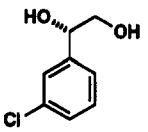


$[\alpha_D]$ = - 47.2 (c 1.9, EtOH)
E.e. 73%

Obtained from *Pp*-39D oxidation of *o*-chlorostyrene.
Absolute configuration established by convergent synthesis.

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993**, *4*, 1365

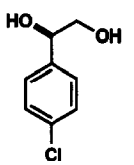


$[\alpha_D]$ = +24.05 (c 1.24, EtOH)
E.e. 95%

Obtained from *Pp*-39D oxidation of *m*-chlorostyrene.
Absolute configuration established by convergent synthesis.

T. Hudlicky, E. E. Boros, C. H. Boros, Department of Chemistry
Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0212

Tetrahedron: Asymmetry **1993**, *4*, 1365

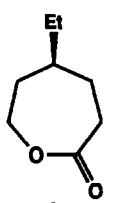


$[\alpha_D]$ = -27.60 (c 0.96, EtOH)
E.e. 79%

Obtained from *Pp*-39D oxidation of *p*-chlorostyrene.
Absolute configuration established by convergent synthesis.

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993**, *4*, 1387

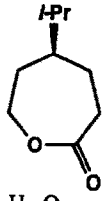


$C_8H_{14}O_2$
5-ethyl-2-oxepanone

E.e. > 98% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 38 (c 5.55, $CHCl_3$)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 5*S* (assignment tentative)

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993,** *4*, 1387

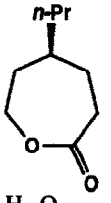


$C_9H_{16}O_2$
5-(2-propyl)-2-oxepanone

E.e. > 98% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 40 (c 0.44, $CHCl_3$)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 5*S* (assignment tentative)

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993,** *4*, 1387

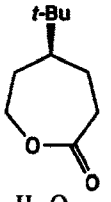


$C_9H_{16}O_2$
5-(1-propyl)-2-oxepanone

E.e. > 98% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 38 (c 6.41, $CHCl_3$)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 5*S* (assignment tentative)

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993,** *4*, 1387

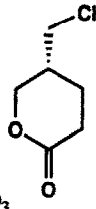


$C_{10}H_{18}O_2$
5-*tert*-butyl-2-oxepanone

E.e. > 98% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 34.9 (c 0.78, $CHCl_3$)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 5*S* (assignment via chemical correlation)

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993,** *4*, 1387

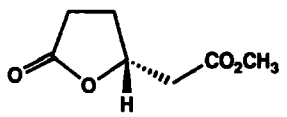


$C_7H_{12}O_3$
tetrahydro-5-(2-hydroxyethyl)-2*H*-pyran-2-one

E.e. > 98% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 6.2 (c 5.66, $CHCl_3$)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 5*S* (assignment tentative)

Michael J. Taschner*, Donald J. Black, and Quin-Zene Chen

Tetrahedron: Asymmetry **1993,** *4*, 1387

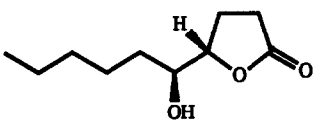


E.e. = 9.6% (by ^{1}H-NMR of a MTPA ester derivative)
$[\alpha]_D$ = - 3.65 (c 0.99, EtOH)
Source of chirality: Enzymatic Baeyer-Villiger oxidation
Absolute Configuration: 2*R* (assignment via chemical correlation)

$C_7H_{10}O_4$
tetrahydro-5-oxo-2-furanacetic acid methyl ester

Wolfgang Albrecht and Roland Tressl

Tetrahedron: Asymmetry **1993,** *4*, 1391



E.e.= 92.4 % [by GC after conversion into the carbamate derivative with (R)-(+)-1-Phenylethylisocyanate]

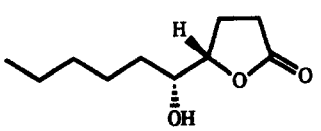
$[\alpha]_D$ = + 26.2 (c 1.74, $CHCl_3$)

Source of chirality: (S)-glutamic acid

Absolute configuration: 4S, 5S

Wolfgang Albrecht and Roland Tressl

Tetrahedron: Asymmetry **1993,** *4*, 1391



E.e.= not determined
$[\alpha]_D$ = +13.3 (c 1.35, $CHCl_3$)

Source of chirality: (S)-glutamic acid

Absolute configuration: 4S, 5R