APPLICATION DATA

Chiral compounds
HPLC

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※Please see "APPLICATION DATA SFC" for applications of chiral compounds using SFC.

YMC CO., LTD.
http://www.ymc.co.jp

Fast Method Scouting for Chiral Separation Utilizing CHIRAL ART Columns

R150423AE

CHIRAL ART are HPLC columns with polysaccharide derivatives chiral selector, and are suitable for separations of wide range of chiral compounds.
On CHIRAL ART Immobilized type with high solvent versatility, chromatographers can freely choose the most suitable mobile phase by considering the solubility and resolution of the target compounds.
The excellent separation of various racemic compounds was achieved through fast method scouting utilizing the short columns and 3 µm CHIRAL ART immobilized type with three different chiral selectors.

Method scouting

● Scouting protocol

Column

CHIRAL ART
3 µm, 50 X 3.0 mmI.D.

Amylose-SA

Cellulose-SB

Cellulose-SC

×

Mobile phase

	Eluent A		Eluent B
NP[*1]	*n*-hexane MTBE[*2] ethyl acetate	×	2-propanol ethanol

Gradient 5-50% Eluent B

[*1]normal phase mode [*2]*t*-Butyl methyl ether

	Eluent A		Eluent B
PO[*3]	acetonitrile methanol	×	ethanol

Gradient 5-20% Eluent B

[*3] polar organic mode

Additive[*4]

Acidic compounds
TFA, Acetic acid, Formic acid, etc.

Basic compounds
DEA[*5], Butylamine, Ethanolamine, etc.

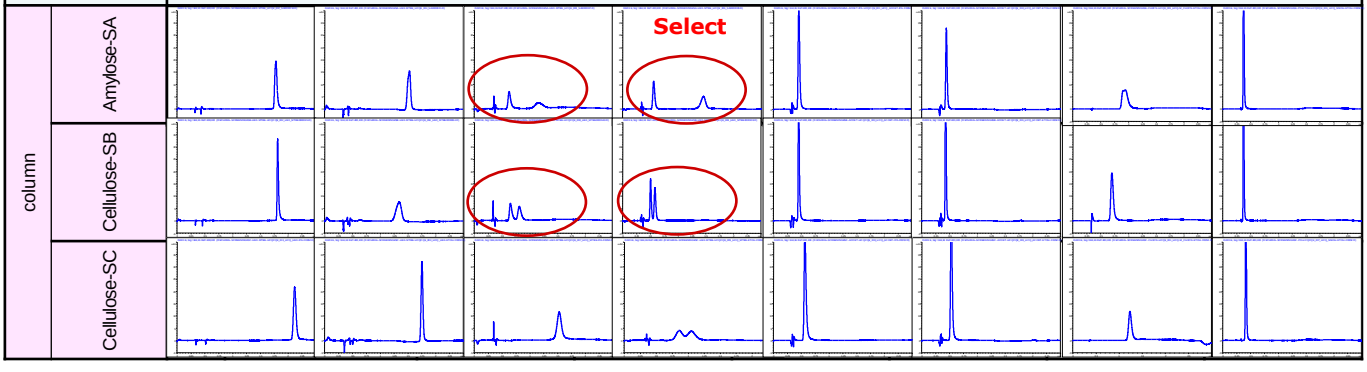
Zwitterionic compounds
Both or either of acidic additive and basic additive

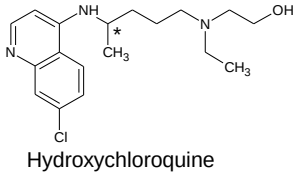
Nonionic compounds
None

[*4] usually 0.1% (upper limit 0.5%)
[*5] diethylamine

● Experimental Matrix

mode	NP						PO	
Eluent A	*n*-hexane		MTBE		ethyl acetate		acetonitrile	methanol
Eluent B	2-propanol	ethanol	2-propanol	ethanol	2-propanol	ethanol	ethanol	ethanol
additive	0.1% DEA							





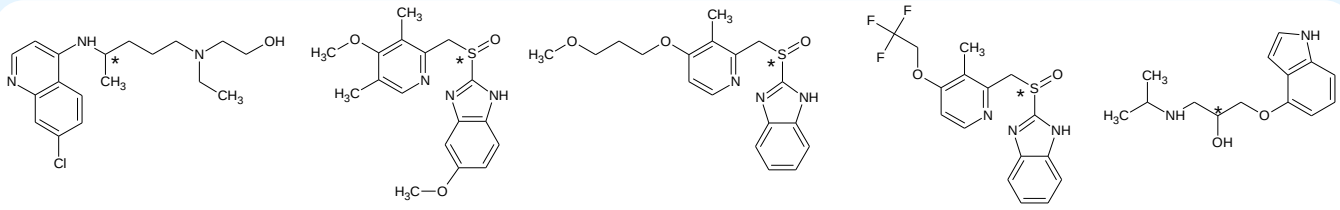
Hydroxychloroquine

Column	: 3 µm, 50 X 3.0 mmI.D.
Flow rate	: 0.85 mL/min
Gradient	: 5%B (0-0.5 min), 5-50%B (0.5-1.5 min), 50%B (1.5-2.0 min) for normal phase mode
	: 0%B (0-0.5 min), 0-20%B (0.5-1.5 min), 20%B (1.5-2.0 min) for polar organic mode
Temperature	: 25℃
Detection	: UV at 265, 290, 334 nm
Injection	: 2 µL (100 mg/mL)

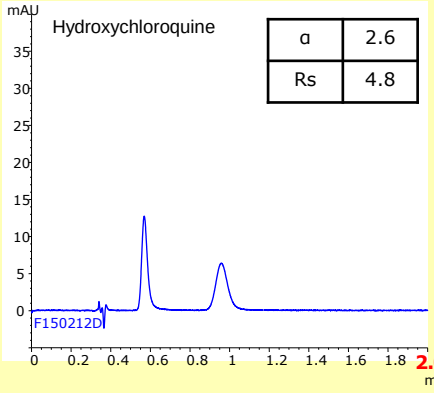
The baseline resolution is achieved under four conditions in the method scouting for hydroxychloroquine.
The combination of Amylose-SA phase and MTBE/ethanol containing 0.1% DEA is selected as the most favorable condition in consideration of retention and resolution.

Separation results under simple isocratic conditions optimized through scouting of each compound

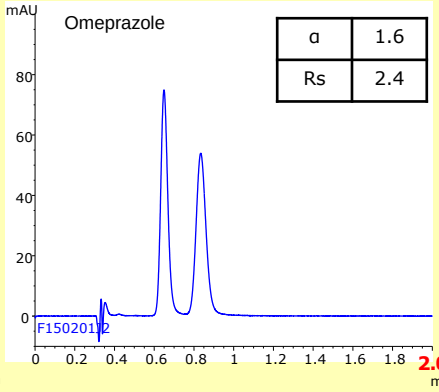
The combination of the short columns packed with three types of 3 µm particles and the rapid gradient elution of eight types of Normal Phase (NP) and Polar Organic (PO) mobile phase are employed for separation method scouting of pharmaceutical compounds below. The selected conditions from scouting with gradient elution for each compound are convertedd to the isocratic elution methods and optimized.



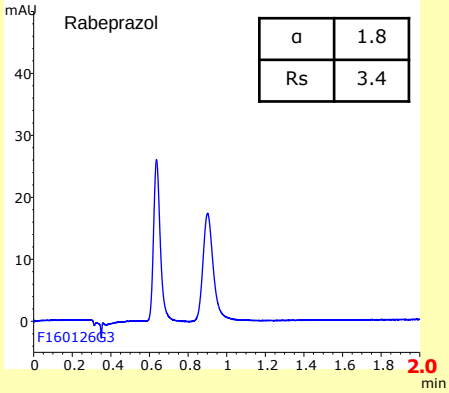
Hydroxychloroquine　Omeprazole　Rabeprazole　Lansoprazole　Pindolol



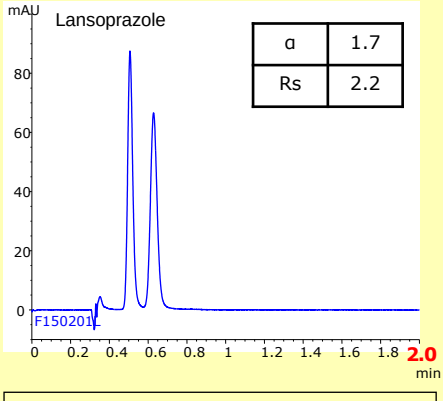
Column	: CHIRAL ART Amylose-SA 3 µm, 50 X 3.0 mmI.D.
Eluent	: A) MTBE/DEA (100/0.1) B) ethanol/DEA (100/0.1) 10%B
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 344 nm
Injection	: 2 µL (100 µg/mL)



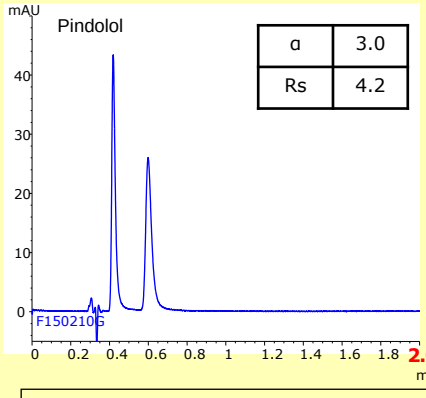
Column	: CHIRAL ART Amylose-SA 3 µm, 50 X 3.0 mmI.D.
Eluent	: A) ethyl acetate/DEA (100/0.1) B) ethanol/DEA (100/0.1) 5%B
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 2 µL (100 µg/mL)



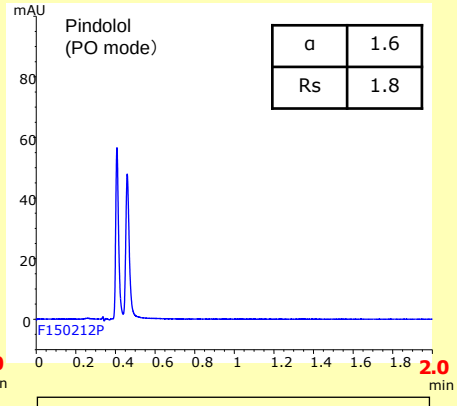
Column	: CHIRAL ART Cellulose-SC 3 µm, 50 X 3.0 mmI.D.
Eluent	: A) ethyl acetate/DEA (100/0.1) B) 2-propanol/DEA (100/0.1) 5%B
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 2 µL (100 µg/mL)



Column	: CHIRAL ART Amylose-SA 3 µm, 50 X 3.0 mmI.D.
Eluen	: A) ethyl acetate/DEA (100/0.1) B) ethanol/DEA (100/0.1) 5%B
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 2 µL (100 µg/mL)



Column	: CHIRAL ART Cellulose-SB 3 µm, 50 X 3.0 mmI.D.
Eluent	: A) *n*-hexane/DEA (100/0.1) B) ethanol/DEA (100/0.1) 60%B
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 265 nm
Injection	: 2 µL (100 µg/mL)



Column	: CHIRAL ART Cellulose-SB 3 µm, 50 X 3.0 mmI.D.
Eluent	: methanol/DEA (100/0.1)
Flow rate	: 0.85 mL/min
Temperature	: 25℃
Detection	: UV at 265 nm
Injection	: 2 µL (100 µg/mL)

DEA: diethylamine

- The fast method development chiral separations is allowed through the method scouting.
- The selected conditions from scouting with gradient elution for each compound are converted to the isocratic elution methods and optimized to achieve the ultra-fast separation method within 2 minutes.

Chiral method optimization of ionic compounds utilizing immobilized type column in reversed phase mode ~ Influence of pH on retention behavior ~

F140718AE

Features of immobilized type columns

Immobilized type CHIRAL ART columns can be used with various solvents that are commonly used for HPLC analysis. They can be used in both normal phase mode and reversed phase mode as they are compatible with non-aqueous and aqueous solvents (*).
Reversed phase mode will be effective in case where a sample is hydrophilic and has limited solubility in organic solvent (e. g. Hexane). In this technical data sheet, we will introduce influence of pH of mobile phase on retention behavior of ionic compounds. We also introduce several example of chiral separation on reversed phase mode.

Specifications (Immobilized type)

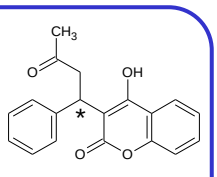
Column/Packing material		Particle size (μm)	Chiral selector	Usable pH range	Temperature range Pressure limit
CHIRAL ART Amylose-SA		3 5 10 20	Amylose tris(3,5-dimethylphenylcarbamate)	2.0-9.0	0～40℃ 30 MPa
CHIRAL ART Cellulose-SB			Cellulose tris(3,5-dimethylphenylcarbamate)		
CHIRAL ART Cellulose-SC			Cellulose tris(3,5-dichlorophenylcarbamate)		
Usable mobile phase	Normal phase	*n*-hexane, *n*-heptane, methanol, ethanol, 2-propanol, acetonitrile, ethyl acetate, tetrahydrofuran, chloroform, *t*-butyl methyl ether, etc.			
	Reversed phase	acetonitrile, methanol, ethanol, 2-propanol, tetrahydrofuran, water, aqueous buffer, etc.			

Tips for optimizing chiral separation method of ionic compounds on reversed phase mode

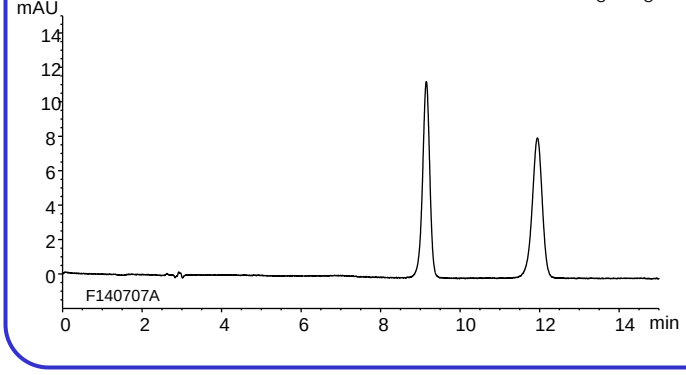
- **Mobile phase > Optimal pH that ionization of analyte is suppressed is recommended. (Retention will be extended and possibility of greater resolution is expected.)**
- **Column > Immobilized type CHIRAL ART columns are the best option.**

Reversed phase analyses with optimized separation methods

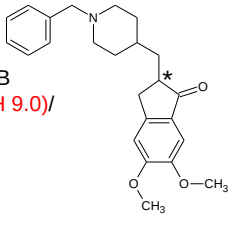
Warfarin (pKa 5.56)



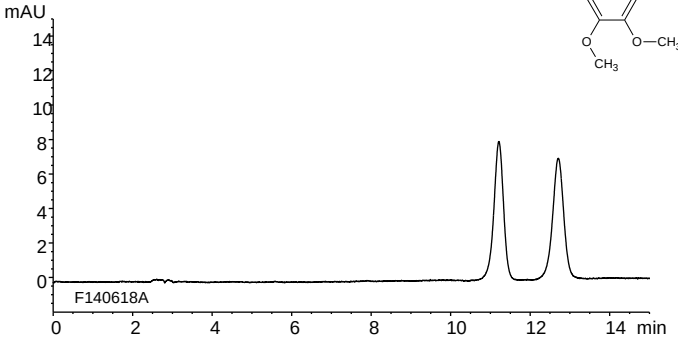
Column : CHIRAL ART Cellulose-SB
Eluent : 20 mM phosphoric acid (pH 2.1)/ acetonitorile (50/50)



Donepezil (pKa 8.62)

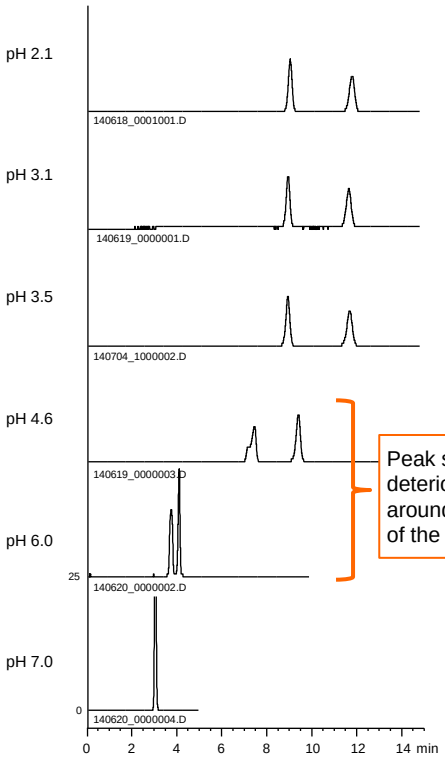


Column : YMC CHIRAL Cellulose-SB
Eluent : 20 mM NH_4HCO_3-DEA (pH 9.0)/ acetonitrile (40/60)

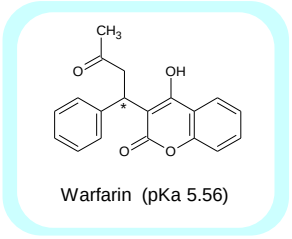


Retention behavior of acid compound on reversed phase mode

● Influence of pH on retention behavior



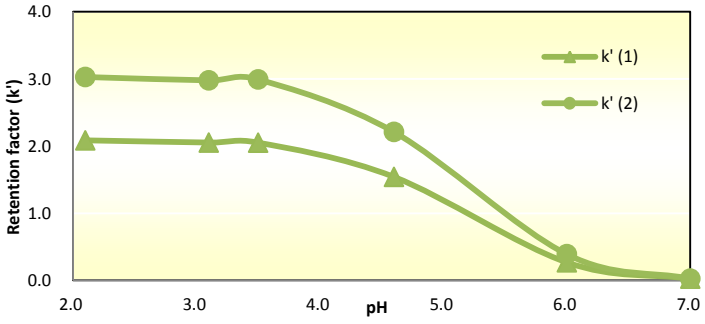
Peak shape may deteriorated at around pKa value of the compound



Warfarin (pKa 5.56)

Column	: CHIRAL ART Cellulose-SB 5 µm 250 X 4.6 mmI.D.
Eluent	: 20 mM phosphate buffer/acetonitrile (50/50)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 2 µL (0.2 mg/mL)

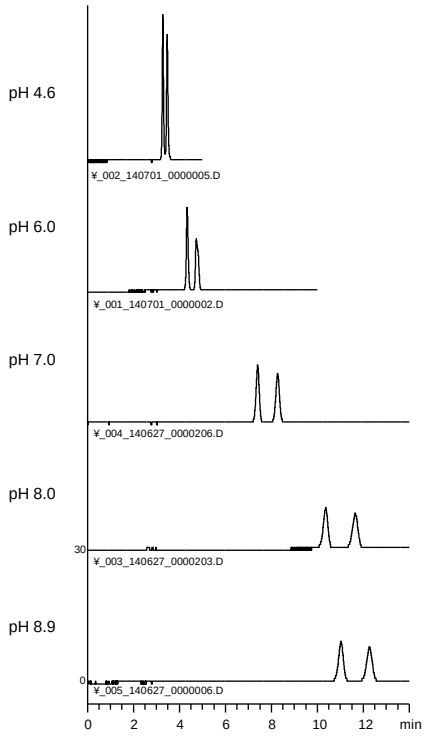
Retention of Warfarin

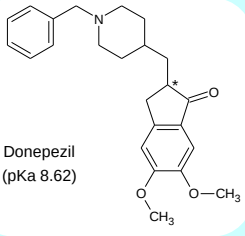


For acidic compound, retention is extended and good separation is achieved when decreasing the pH of a mobile phase (ionization was suppressed).

Retention behavior of basic compound on reversed phase mode

● Influence of pH on retention behavior

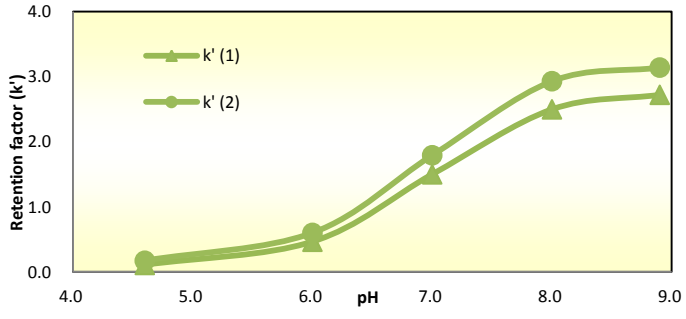




Donepezil
(pKa 8.62)

Column	: CHIRAL ART Cellulose-SB 5 µm 250 X 4.6 mmI.D.
Eluent	: 20 mM phosphate buffer/acetonitrile (40/60)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 2 µL (0.2 mg/mL)

Retention of Donepezil

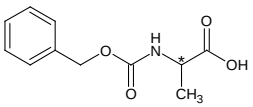


For basic compound, retention is extended and good separation is achieved when increasing the pH of a mobile phase (ionization was suppressed).

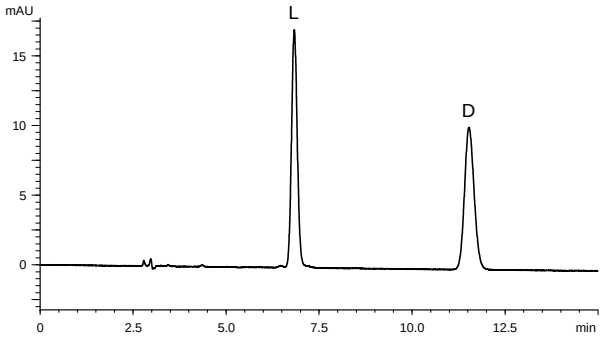
HPLC Analytical Data

N-CBZ-DL-アラニン
N-CBZ-DL-Alanine

D180129C



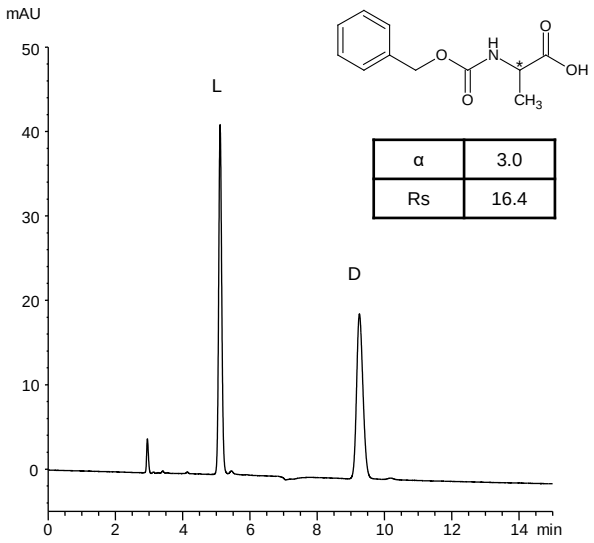
α	2.2
Rs	12.4



Column	: CHIRAL ART Amylose-C Neo (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (1 mg/mL)

N-CBZ-DL-アラニン
N-CBZ-DL-Alanine

V130812E

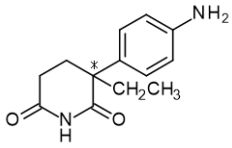


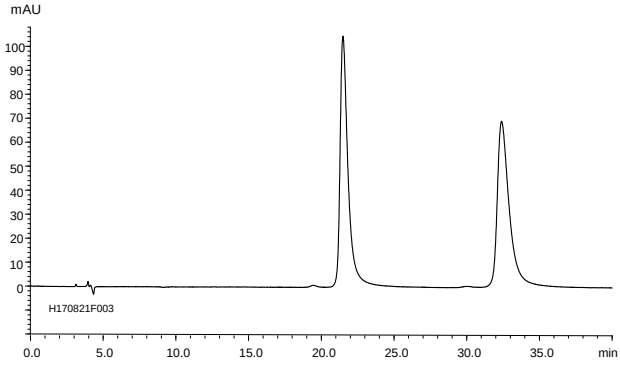
α	3.0
Rs	16.4

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (1 mg/mL)

DL-アミノグルテチミド
DL-Aminoglutethimide

H170821F

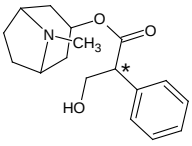




Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethyl acetate/diethylamine (70/30/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 5 µL (1 mg/mL)

アトロピン
Atropine

H131008C

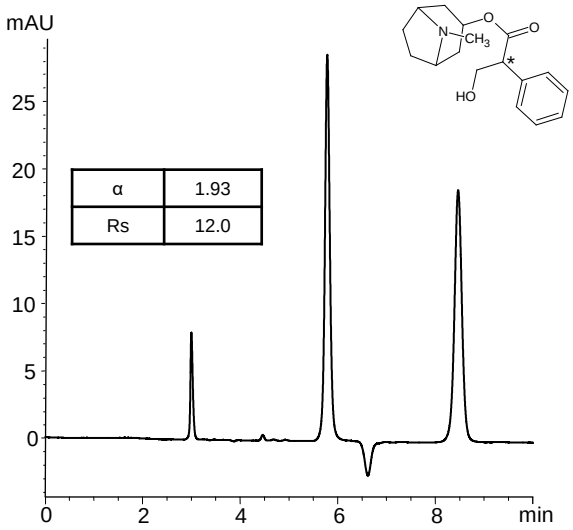


α	1.25
Rs	4.18

Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/ethanolamine (87/13/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 2 µL (1 mg/mL)

アトロピン
Atropine

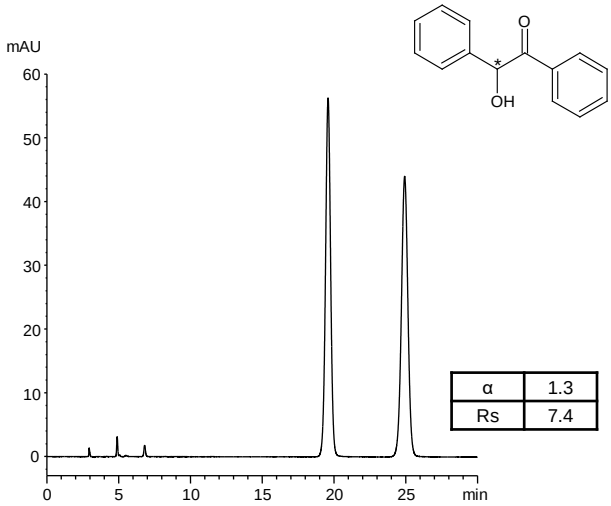
H131009C



Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/ethanolamine (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 2 µL (1 mg/mL)

ベンゾイン
Benzoin

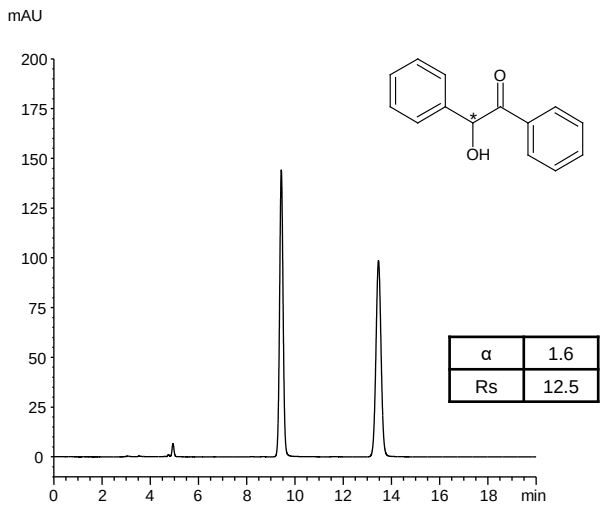
V130905B



Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

ベンゾイン
Benzoin

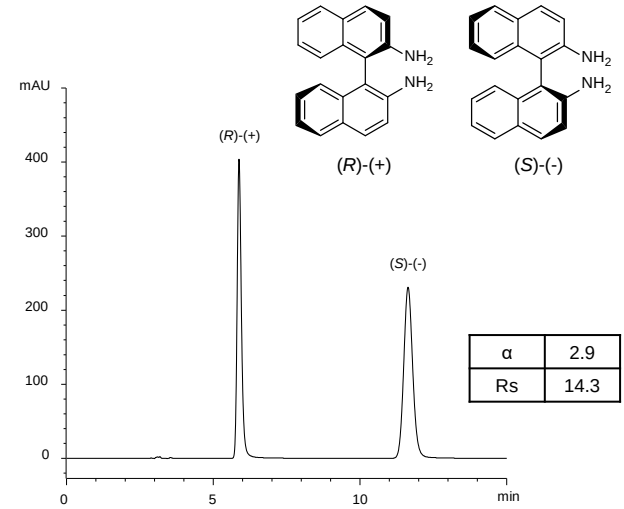
V130812F



Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

1,1'-ビナフチル-2,2'-ジアミン
1,1'-Binaphthyl-2,2'-diamine

E170801V

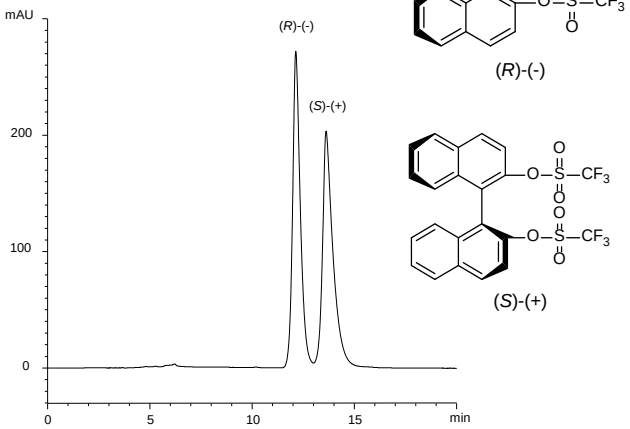


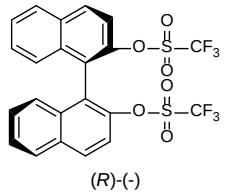
Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (50/50)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 240 nm
Injection	: 10 µL (0.025 mg/mL)
Sample	: Supplied by Tokyo Chemical Industry Co., Ltd.

1,1'-ビナフチル-2,2'-ジイルビス (トリフルオロメタンスルホナート)

1,1'-Binaphthyl-2,2'-diyl Bis(trifluoromethanesulfonate) E170901B

α	1.1
Rs	1.8





(*R*)-(-)

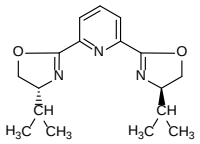
(*S*)-(+)

Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/methyl *tert*-butyl ether (100/2)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 285 nm
Injection	: 10 µL (0.5 mg/mL)
Sample	: Supplied by Tokyo Chemical Industry Co., Ltd.

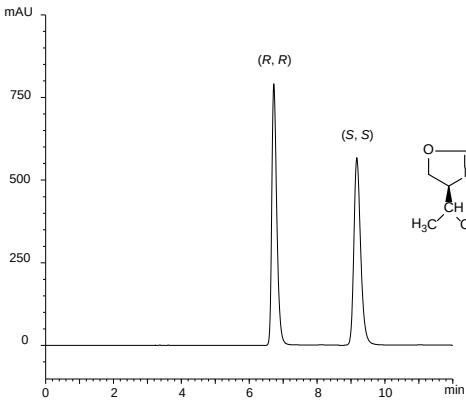
2,6-ビス(4-イソプロピル-2-オキサゾリン-2-イル)ピリジン

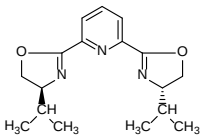
2,6-Bis(4-isopropyl-2-oxazolin-2-yl)pyridine E170727B

α	1.6
Rs	7.6



(*R*, *R*)





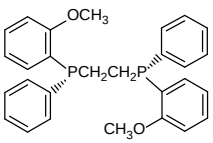
(*S*, *S*)

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (60/40)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 285 nm
Injection	: 10 µL (0.5 mg/mL)
Sample	: Supplied by Tokyo Chemical Industry Co., Ltd.

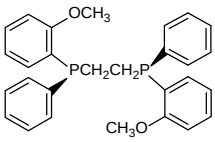
1,2-ビス[(2-メトキシフェニル)フェニルホスフィノ]エタン

1,2-Bis[(2-methoxyphenyl)phenylphosphino]ethane T180515B

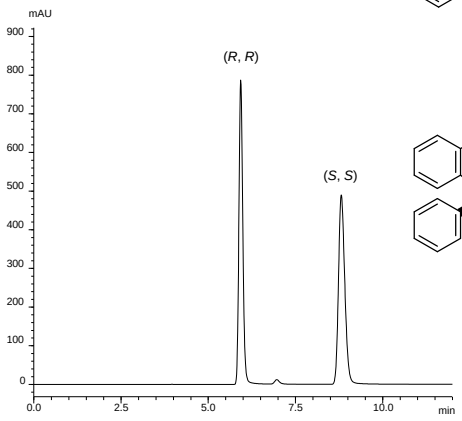
α	1.9
Rs	10.9



(*R*, *R*)



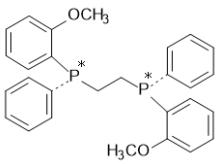
(*S*, *S*)

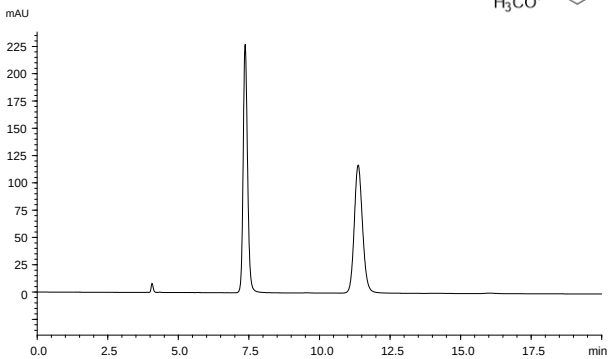


Column	: CHIRAL ART Amylose-C Neo (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 285 nm
Injection	: 10 µL (0.5 mg/mL)

1,2-ビス[(2-メトキシフェニル)フェニルホスフィノ]エタン

1,2-Bis[(2-methoxyphenyl)phenyl-phosphino]ethane H170821E

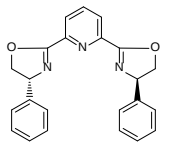




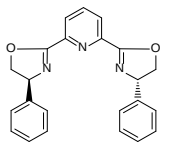
Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/chloroform (80/20)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 5 µL (1.0 mg/mL)

2,6-ビス(4-フェニル-2-オキサゾリン-2-イル)ピリジン
2,6-Bis(4-phenyl-2-oxazolin-2-yl)pyridine

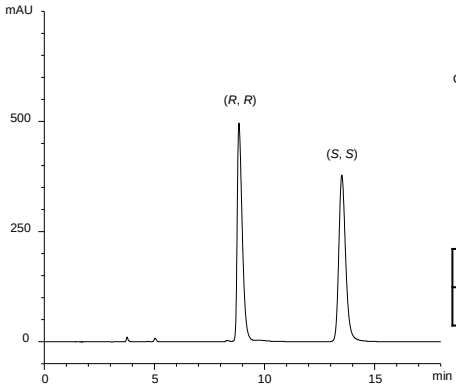
E170801B



(*R*, *R*)



(*S*, *S*)

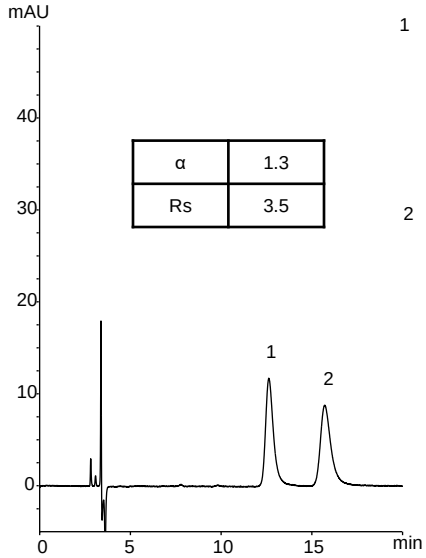


α	1.7
Rs	9.5

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol (40/60)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 285 nm
Injection	: 10 µL (0.5 mg/mL)
Sample	: Supplied by Tokyo Chemical Industry Co., Ltd.

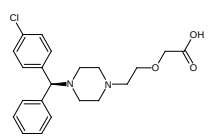
セチリジン(レボセチリジン)
Cetirizine (Levocetirizine)

F141211A



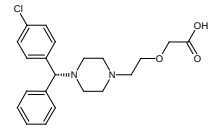
α	1.3
Rs	3.5

1



(*S*)-Cetirizine

2

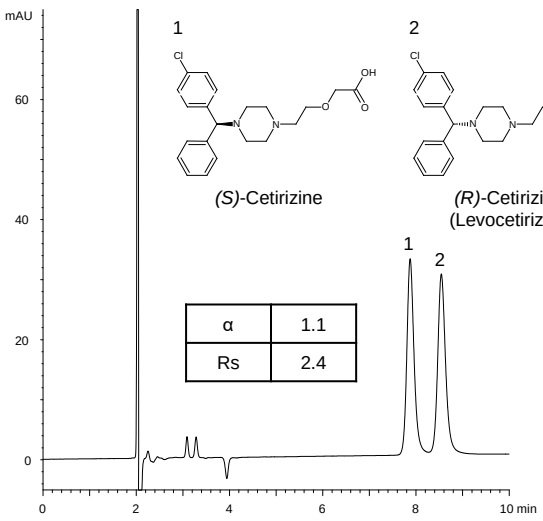


(*R*)-Cetirizine
(Levocetirizine)

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/formic acid/diethylamine (70/30/0.1/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 2 µL (200 µg/mL)

セチリジン(レボセチリジン)
Cetirizine(Levocetirizine)

F180214C



1

(*S*)-Cetirizine

2

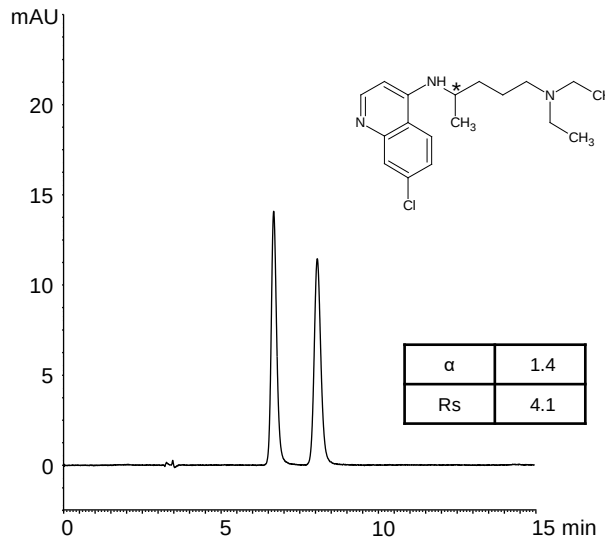
(*R*)-Cetirizine
(Levocetirizine)

α	1.1
Rs	2.4

Column	: CHIRAL ART Cellulose-SB (3 µm) 150 X 4.6 mmI.D.
Eluent	: acetonitrile/formic acid/diethylamine (100/0.1/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 2 µL (200 µg/mL)

クロロキン
Chloroquine

F140602C



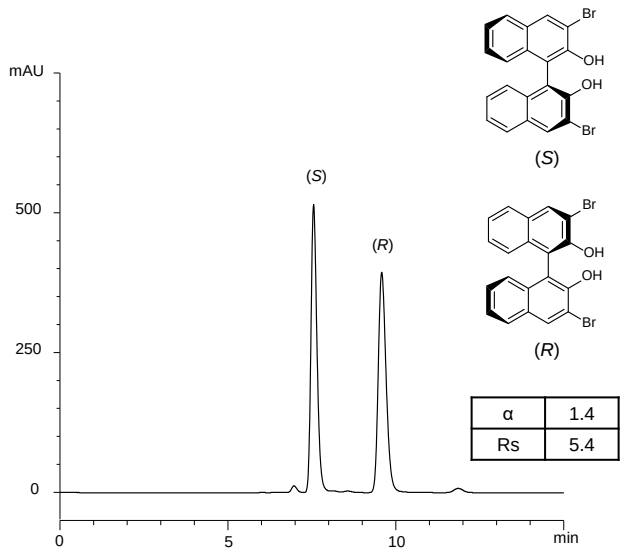
α	1.4
Rs	4.1

Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: MTBE*/ethanol/diethylamine (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 344 nm
Injection	: 5 µL (100 µg/mL)

*methyl *tert*-butyl ether

3,3‘-ジブロモ-1,1’-ビ-2-ナフトール
3,3'-Dibromo-1,1'-bi-2-naphthol

E170810Q

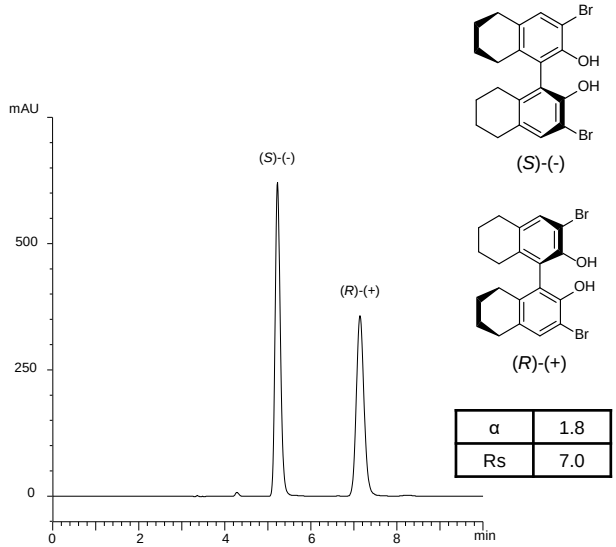


α	1.4
Rs	5.4

Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol (75/25)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 285 nm
Injection	: 10 µL (0.5 mg/mL)

3,3‘-ジブロモ-5,5’,6,6‘,7,7’,8,8‘-オクタヒドロ-1,1’-ビ-2-ナフトール
3,3'-Dibromo-5,5',6,6',7,7',8,8'-octahydro-1,1'-bi-2-naphthol

E170801S

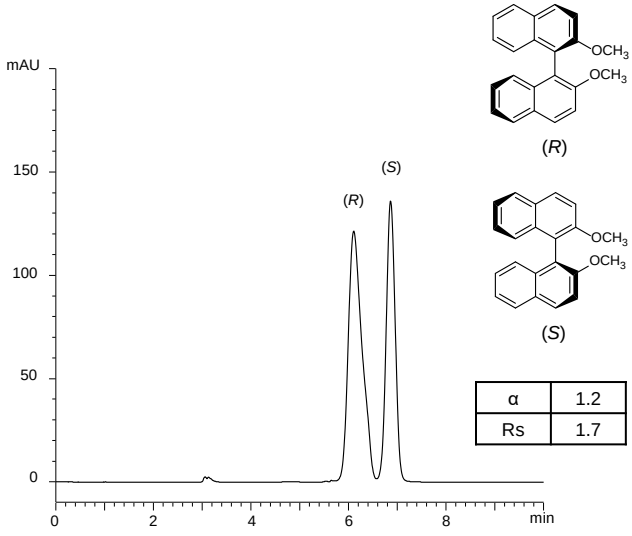


α	1.8
Rs	7.0

Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (70/30)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 10 µL (0.5 mg/mL)

2,2‘-ジメトキシ-1,1’-ビナフチル
2,2'-Dimethoxy-1,1'-binaphthyl

E170802P

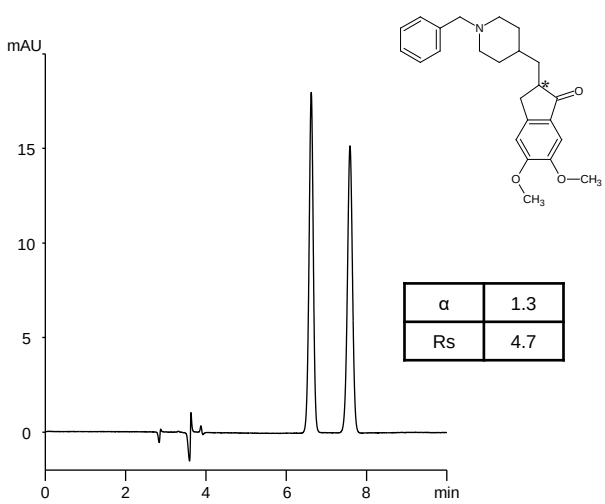


α	1.2
Rs	1.7

Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (95/5)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 10 µL (0.0125 mg/mL)

ドネペジル
Donepezil

F131114B

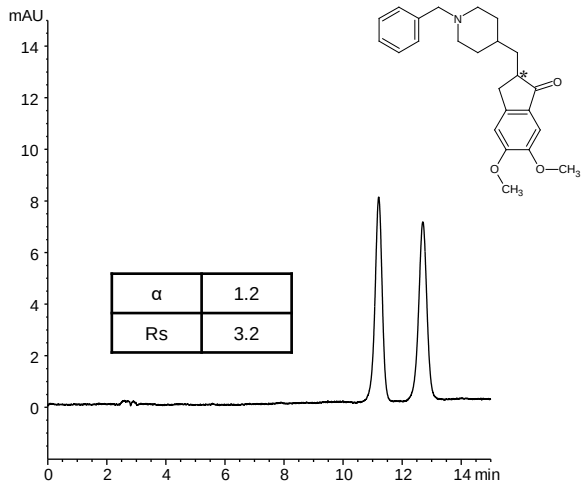


α	1.3
Rs	4.7

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/ethylenediamine (85/15/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 271 nm
Injection	: 10 µL (20 µg/mL)

ドネペジル
Donepezil

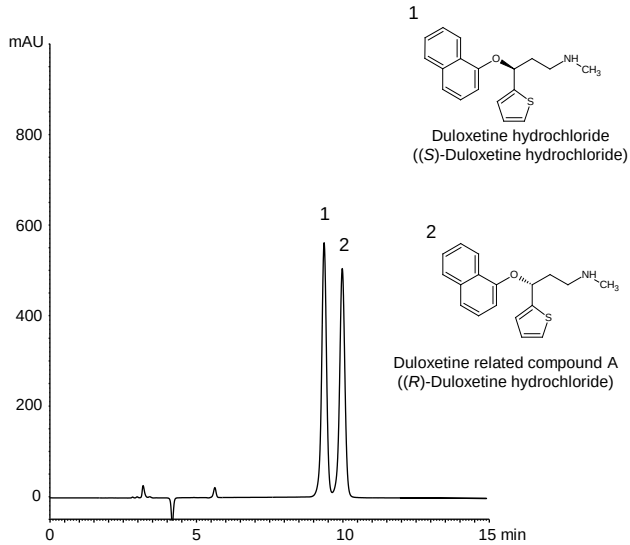
F140707A



Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: 20 mM NH_4HCO_3-diethylamine (pH 9.0)/acetonitrile (40/60)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 2 µL (200 µg/mL)

デュロキセチン塩酸塩
Duloxetine hydrochloride

F131003A



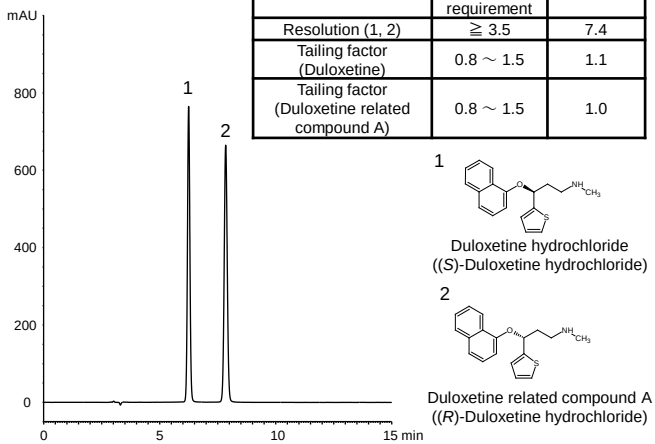
Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/diethylamine (95/5/0.2)
Flow rate	: 1.0 mL/min
Temperature	: 30℃
Detection	: UV at 230 nm
Injection	: 10 µL (0.1 mg/mL)

デュロキセチン塩酸塩（米国薬局方記載条件）
Duloxetine hydrochloride (The United States Pharmacopeia)

F130930A

System suitability solution*
(0.1 mg/mL Duloxetine hydrochloride,
0.1 mg/mL Duloxetine related compound A)

	System suitability requirement	Result
Resolution (1, 2)	≧ 3.5	7.4
Tailing factor (Duloxetine)	0.8 ～ 1.5	1.1
Tailing factor (Duloxetine related compound A)	0.8 ～ 1.5	1.0



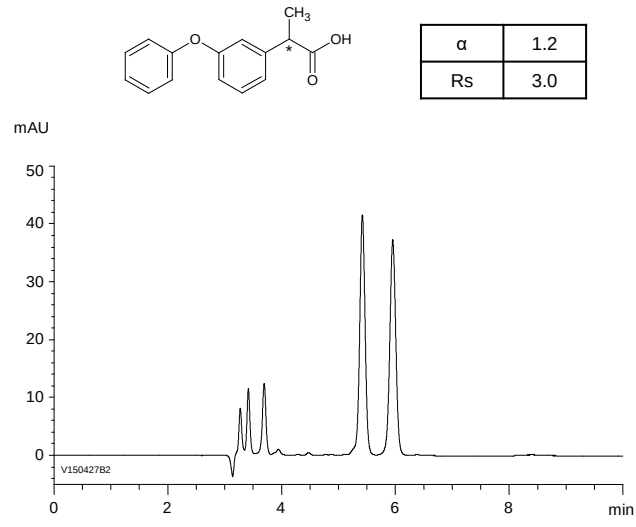
Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propranol/diethylamine (83/17/0.2)
Flow rate	: 1.0 mL/min
Temperature	: 40℃
Detection	: UV at 230 nm
Injection	: 10 µL

(The United States Pharmacopeia 37th; Limit of Duloxetine related compound A)

*System suitability solution was prepared from duloxetine hydrochloride and duloxetine related compound A supplied as reagents for laboratory use.

フェノプロフェン
Fenoprofen

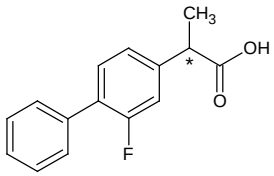
V150427B



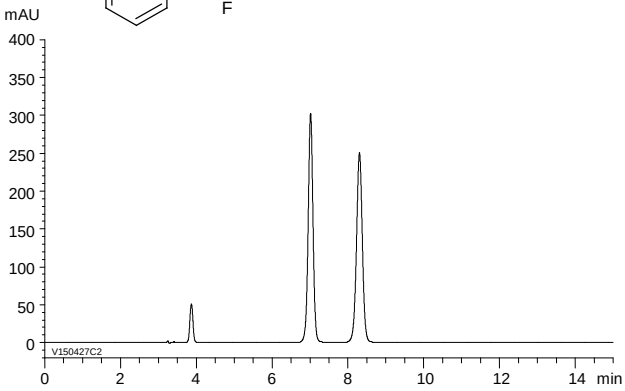
Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

フルルビプロフェン
Flurbiprofen

V150427C



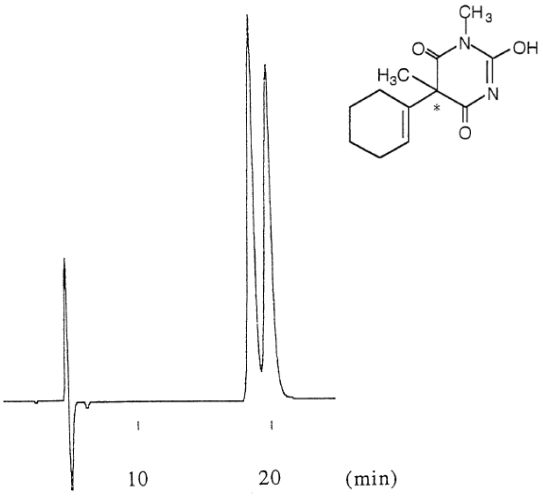
α	1.3
Rs	5.1



Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

ヘキソバルビタール
Hexobarbital

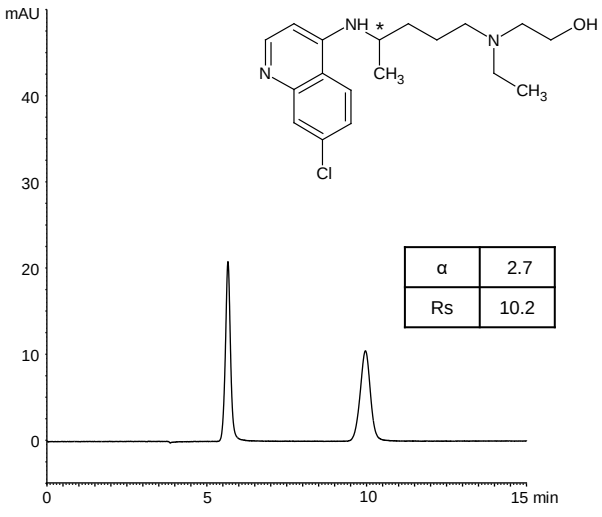
N020605C



Column	: YMC CHIRAL NEA (R) 250 X 4.6 mmI.D.
Eluent	: acetonitrile/water (30/70)
Flow rate	: 0.7 mL/min
Temperature	: ambient
Detection	: UV at 210 nm
Injection	: 1 µL (1.2 mg/mL)

ヒドロキシクロロキン
Hydroxychloroquine

F140526A



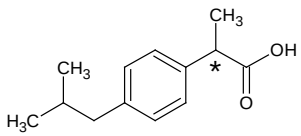
α	2.7
Rs	10.2

Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: MTBE*/ethanol/diethylamine (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 344 nm
Injection	: 5 µL (100 µg/mL)

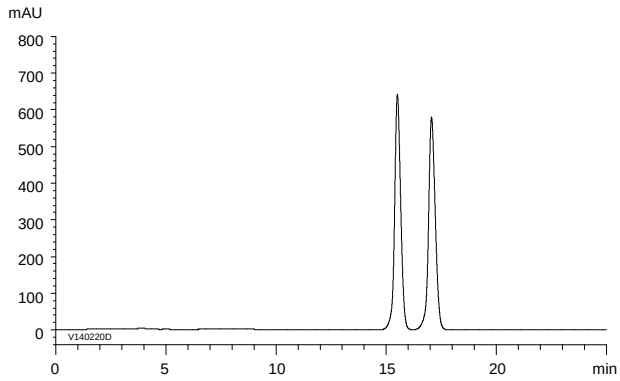
*methyl *tert*-butyl ether

イブプロフェン
Ibuprofen

V140220D



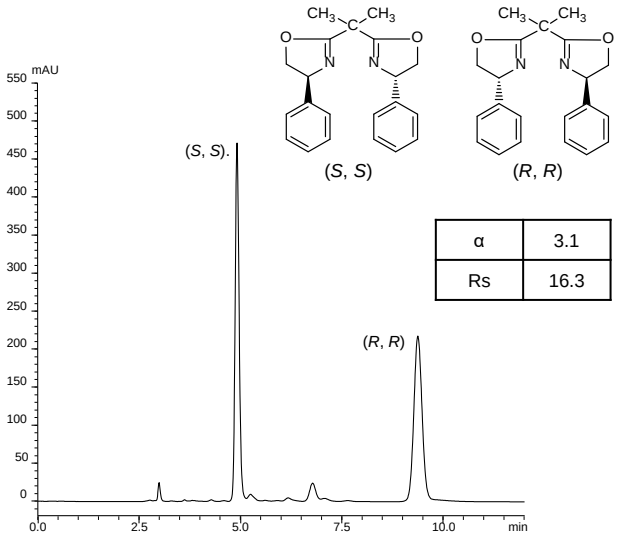
α	1.1
Rs	3.0



Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (99/1/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 220 nm
Injection	: 10 µL (1 mg/mL)

2,2'-イソプロピリデンビス(4-フェニル-2-オキサゾリン)
2,2'-Isopropylidenebis(4-phenyl-2-oxazoline)

T180515F

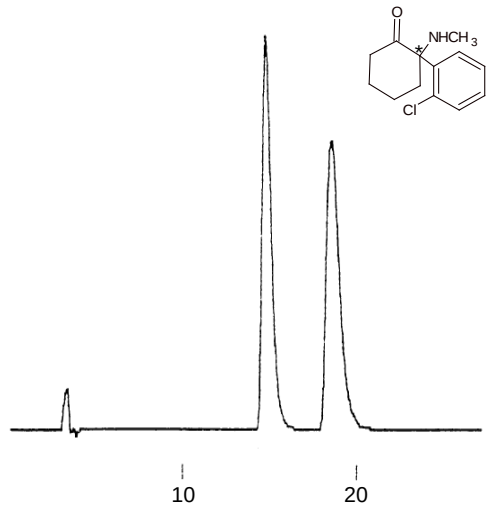


α	3.1
Rs	16.3

Column	: CHIRAL ART Amylose-C Neo (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (70/30)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 210 nm
Injection	: 10 µL (0.1 mg/mL)

塩酸ケタミン
Ketamine hydrochloride

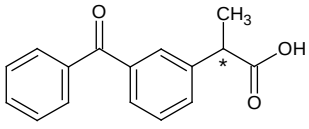
N020605F



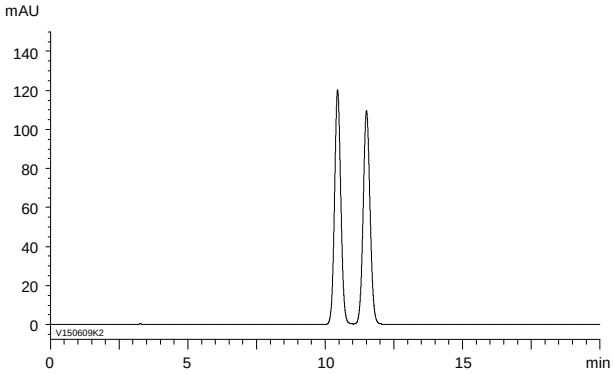
Column	: YMC CHIRAL NEA (R) 250 X 4.6 mmI.D.
Eluent	: acetonitrile/0.5 M $NaClO_4$ (40/60)
Flow rate	: 1.0 mL/min
Temperature	: ambient
Detection	: UV at 268 nm
Injection	: 10 µL (1.4 mg/mL)

ケトプロフェン
Ketoprofen

V150609K



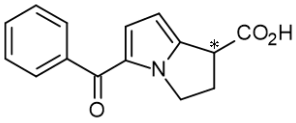
α	1.1
Rs	2.4

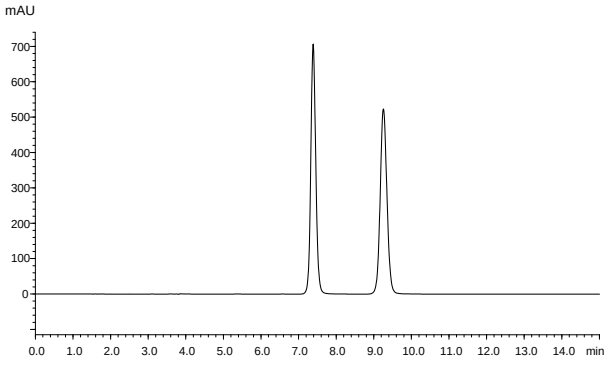


Column	: CHIRAL ART Cellulose-SC (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

ケトロラック
Ketrolac

H170821D

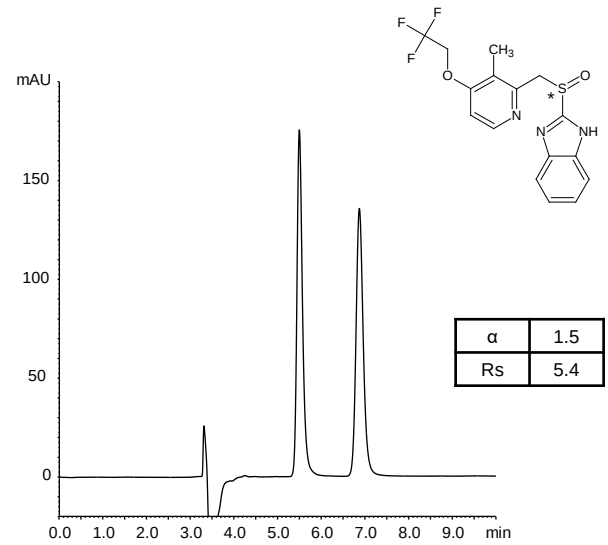




Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/tetrahydrofuran/TFA (70/30/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 305 nm
Injection	: 5 µL (1.0 mg/mL)

ランソプラゾール
Lansoprazole

F150216B

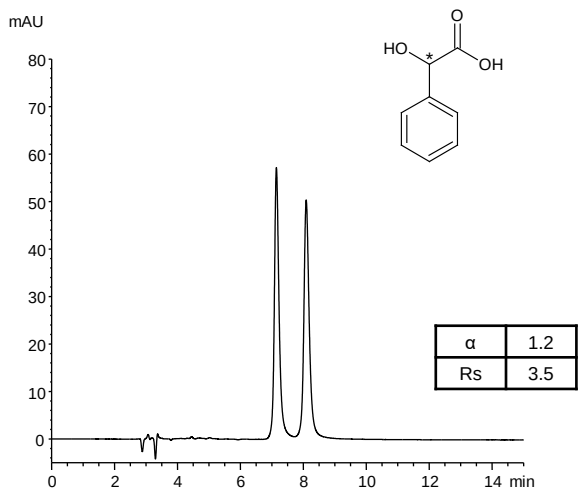


α	1.5
Rs	5.4

Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: ethyl acetate/ethanol/diethylamine (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 10 µL (100 µg/mL)

DL-マンデル酸
DL-Mandelic acid

V130917A

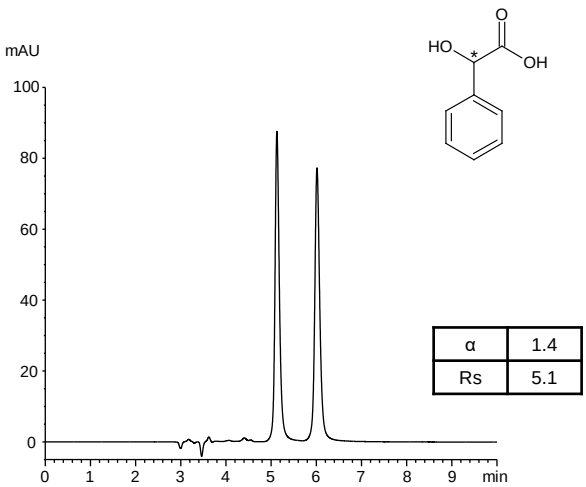


α	1.2
Rs	3.5

Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 20 µL (1 mg/mL)

DL-マンデル酸
DL-Mandelic acid

V130917B

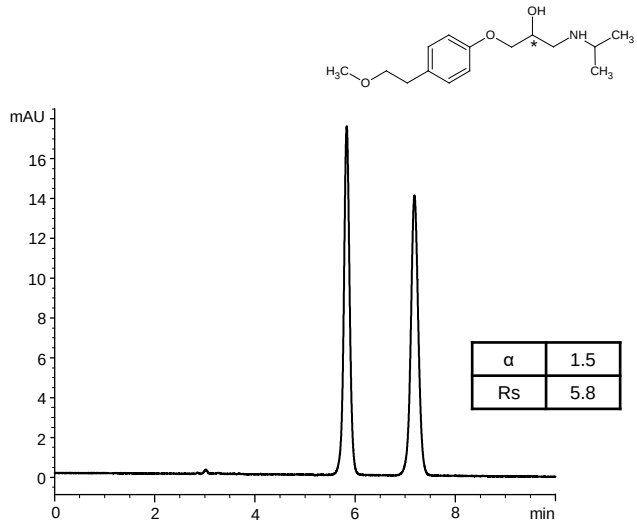


α	1.4
Rs	5.1

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 20 µL (1 mg/mL)

メトプロロール
Metoprolol

H131008D

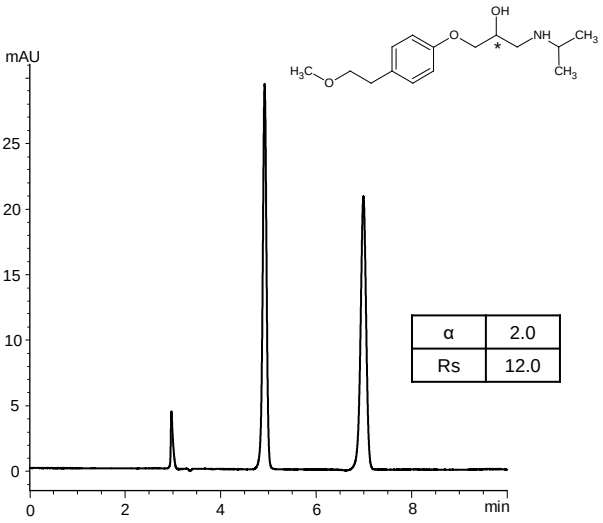


α	1.5
Rs	5.8

Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/ethanolamine (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 5 µL (1 mg/mL)

メトプロロール
Metoprolol

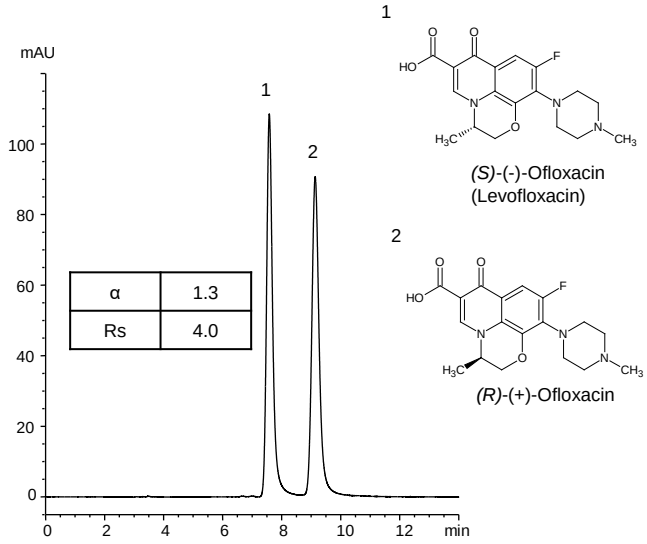
H131009B



Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/ethanolamine (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 5 µL (1 mg/mL)

オフロキサシン(レボフロキサシン)
Ofloxacin (Levofloxacin)

F150319A

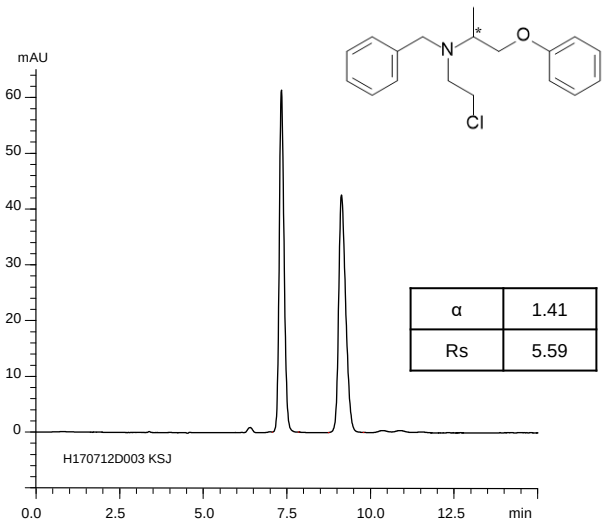


Column	: CHIRAL ART Cellulose-SC (5 µm) 250 X 4.6 mmI.D.
Eluent	: MTBE*/ethanol/acetic acid/ethylenediamine (50/50/0.1/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 40℃
Detection	: UV at 300 nm
Injection	: 5 µL (100 µg/mL)

*methyl *tert*-butyl ether

フェノキシベンザミン
Phenoxybenzamine

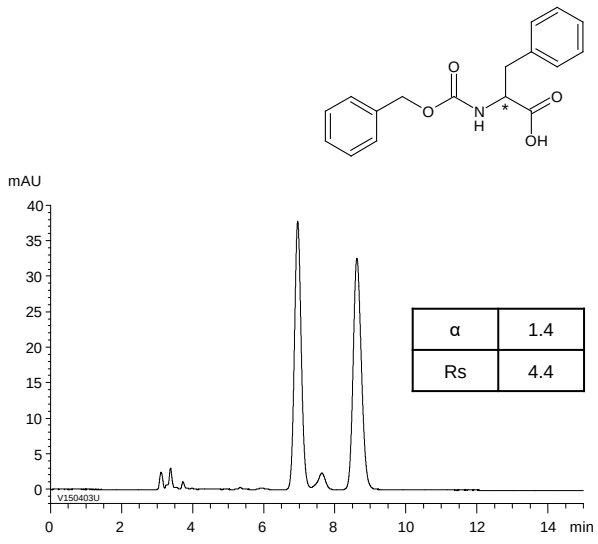
H170712D



Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/diethylamine (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 270 nm
Injection	: 5 µL (1 mg/mL)

N-CBZ-DL-フェニルアラニン
N-CBZ-DL-Phenylalanine

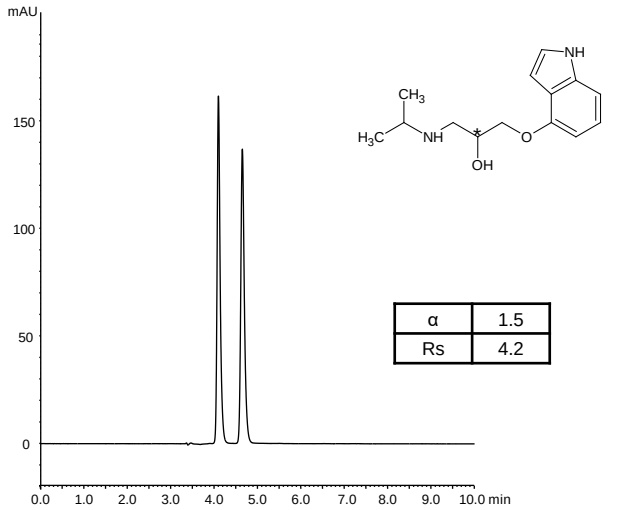
V150403U



Column	: CHIRAL ART Cellulose-SC (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (1 mg/mL)

ピンドロール
Pindolol

F150213C

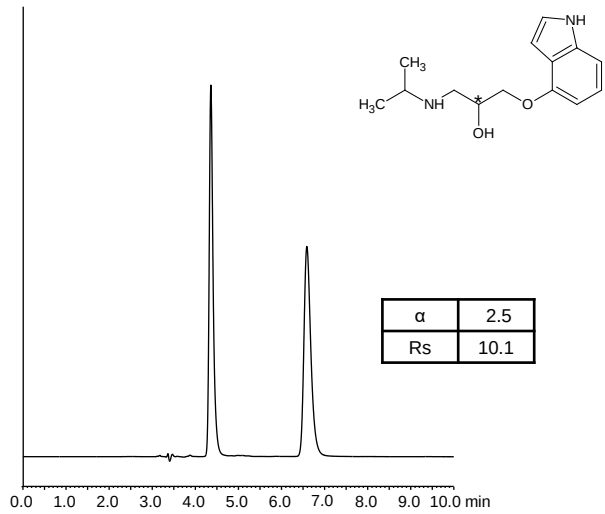


α	1.5
Rs	4.2

Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: methanol/diethylamine (100/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 265 nm
Injection	: 10 µL (100 µg/mL)

ピンドロール
Pindolol

F150216A

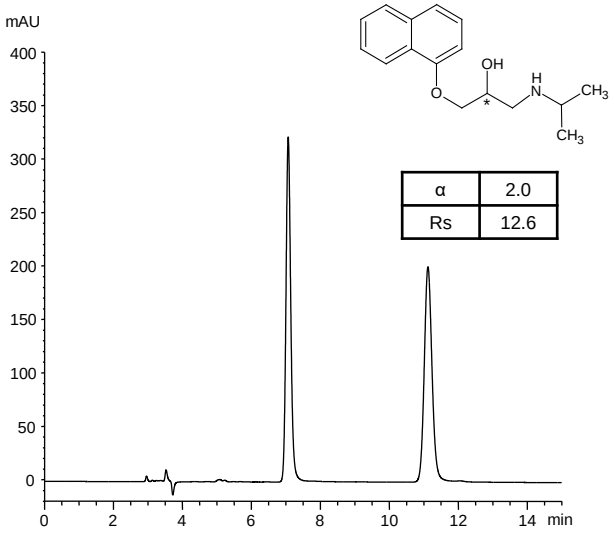


α	2.5
Rs	10.1

Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/diethylamine (40/60/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 265 nm
Injection	: 10 µL (100 µg/mL)

プロプラノロール
Propranolol

V130816A

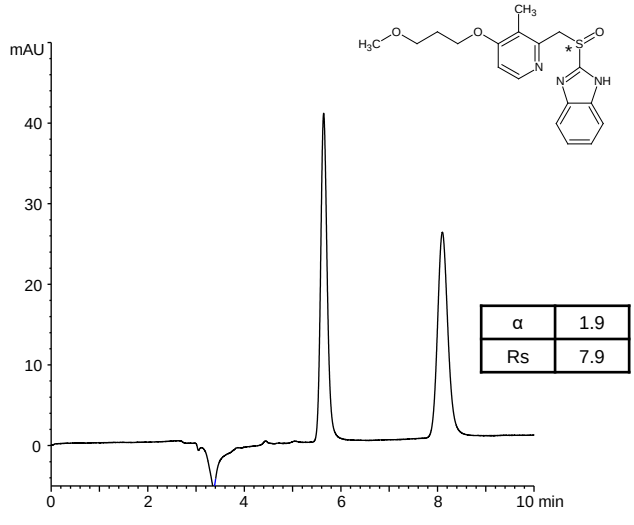


α	2.0
Rs	12.6

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/diethylamine (80/20/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 10 µL (0.1 mg/mL)

ラベプラゾール
Rabeprazole

F150316A



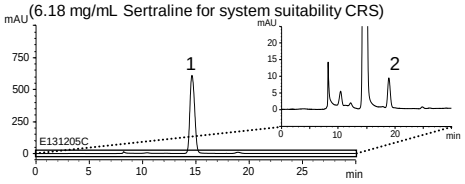
α	1.9
Rs	7.9

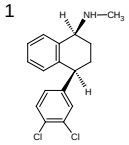
Column	: CHIRAL ART Cellulose-SC (5 µm) 250 X 4.6 mmI.D.
Eluent	: ethyl acetate/2-propanol/diethylamine (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 290 nm
Injection	: 5 µL (100 µg/mL)

セルトラリン塩酸塩（欧州薬局方記載条件）
Sertraline hydrochloride (The European Pharmacopoeia)

E131206B

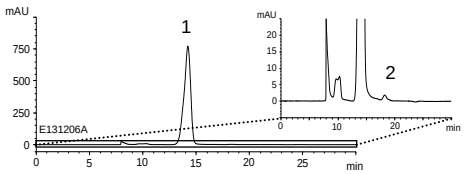
(A) Reference solution (a)*1 (6.18 mg/mL Sertraline for system suitability CRS)

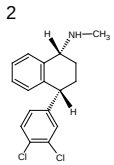




Sertraline hydrochloride

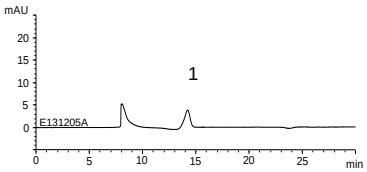
(B) Test solution*1 (6.0 mg/mL Sertraline hydrochloride)





Sertraline hydrochloride (enantiomer)

(C) Reference solution (b)*1 (0.03 mg/mL Sertraline hydrochloride)



*1 Test solution and Reference solution were prepared from Sertraline hydrochloride supplied as a reagent for laboratory use.

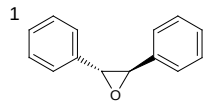
Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: mixture*2/*n*-hexane (70/30)
Flow rate	: 0.4 mL/min
Temperature	: 25℃
Detection	: UV at 275 nm
Injection	: 20 µL

(The draft for The European Pharmacopoeia; Enantiomeric purity)

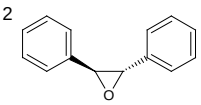
*2 *n-hexane/2-propanol/diethylamine (975/25/1)*

トランススチルベンオキサイド
trans-Stilbene oxide

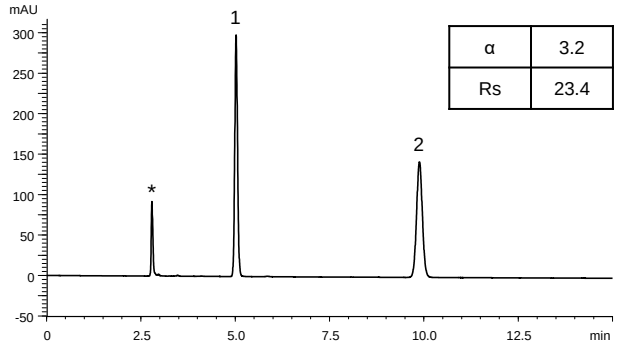
D180129B



(+)-*R*,*R*-*trans*-Stilbene oxide



(-)-*S*,*S*-*trans*-Stilbene oxide



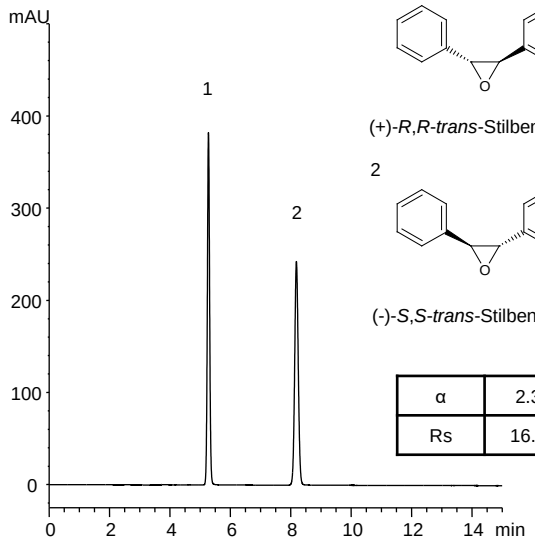
α	3.2
Rs	23.4

* 1,3,5-Tri-*tert*-butylbenzene (0.5 mg/mL, t_0 marker)

Column	: CHIRAL ART Amylose-C Neo (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 5 µL (0.1 mg/mL)

トランススチルベンオキサイド
trans-Stilbene oxide

V130812D



(+)-*R*,*R*-*trans*-Stilbene oxide

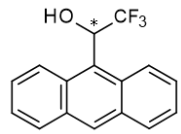
(-)-*S*,*S*-*trans*-Stilbene oxide

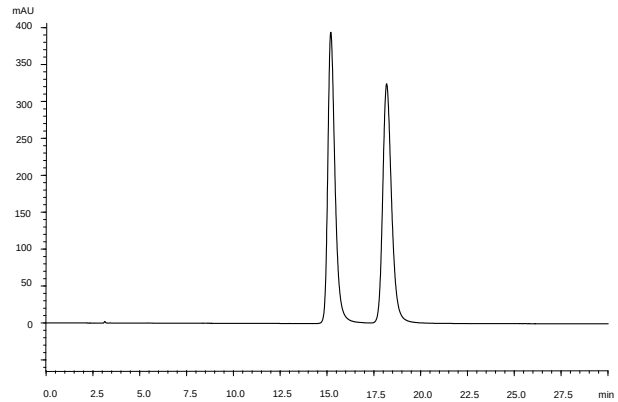
α	2.3
Rs	16.8

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 5 µL (0.1 mg/mL)

トリフルオロアンスリルエタノール
2,2,2-Trifluoro-1-(9-anthryl)ethanol

H170821C

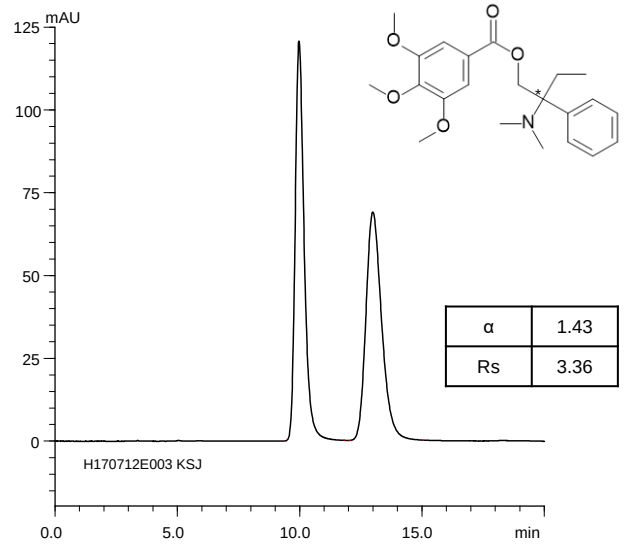




Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/tetrahydrofuran (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

トリメブチン
Trimebutine

H170712E

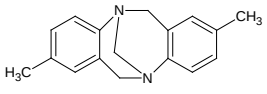


α	1.43
Rs	3.36

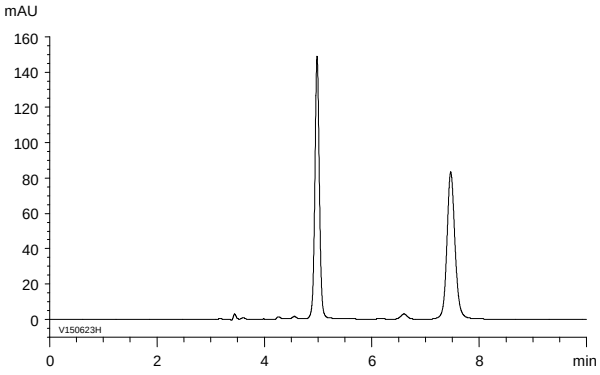
Column	: CHIRAL ART Cellulose-SJ (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol/diethylamine (95/5/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 265 nm

トレガー塩基
Troger's base

V150623H



α	2.3
Rs	12.2

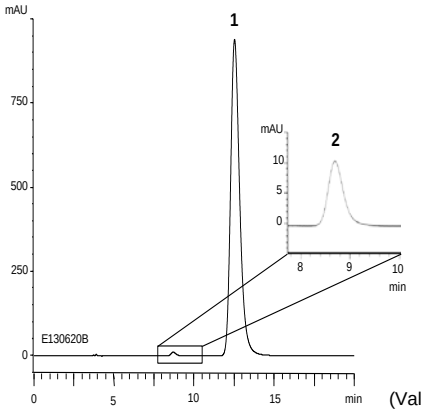


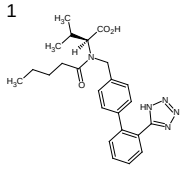
Column	: CHIRAL ART Amylose-SA (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/ethanol (90/10)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (0.1 mg/mL)

バルサルタン(米国薬局方記載条件)
Valsartan (The United States Pharmacopeia)

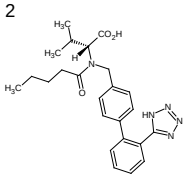
E130620B

Test solution*
(1.0 mg/mL Valsartan)





Valsartan



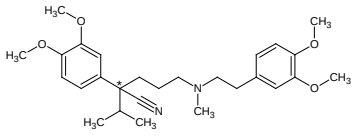
Valsartan enantiomer
(Valsartan related compound A)

Column	: CHIRAL ART Cellulose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/TFA (85/15/0.1)
Flow rate	: 0.8 mL/min
Temperature	: 25℃
Detection	: UV at 230 nm
Injection	: 10 µL
(The United States Pharmacopeia 34th; Related compounds)	

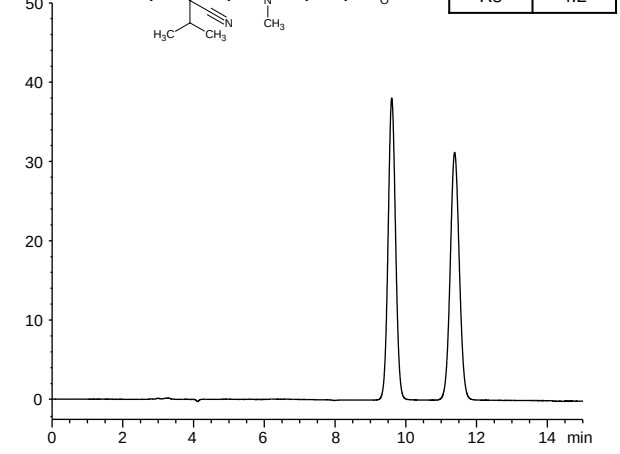
* Test solution was prepared from Valsartan supplied as a reagent for laboratory use.

ベラパミル
Verapamil

V130905D



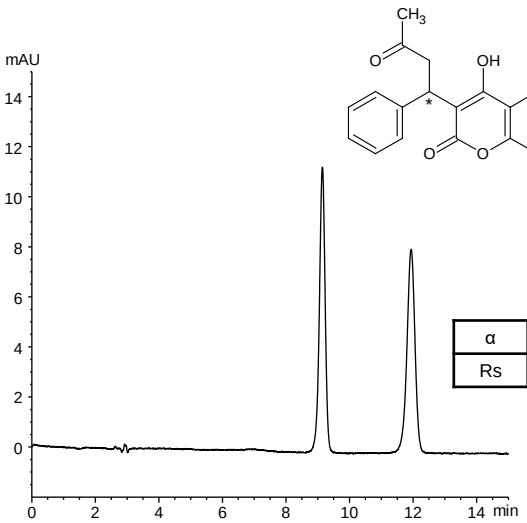
α	1.3
Rs	4.2



Column	: CHIRAL ART Amylose-C (5 µm) 250 X 4.6 mmI.D.
Eluent	: *n*-hexane/2-propanol/diethylamine (90/10/0.1)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 10 µL (1 mg/mL)

ワルファリン
Warfarin

F140618A



α	1.5
Rs	7.3

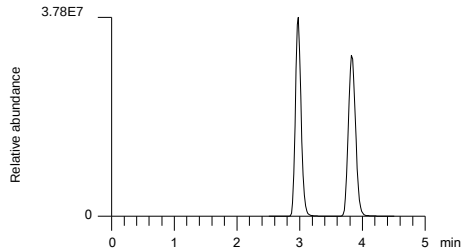
Column	: CHIRAL ART Cellulose-SB (5 µm) 250 X 4.6 mmI.D.
Eluent	: acetonitrile/20 mM phosphoric acid (50/50)
Flow rate	: 1.0 mL/min
Temperature	: 25℃
Detection	: UV at 254 nm
Injection	: 2 µL (200 µg/mL)

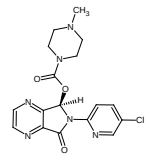
ゾピクロン
Zopiclone

F170925D

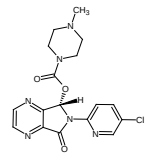
Extracted ion chromatograms (m/z 389.11 > 245.022)

Spiked hair
(5.0 ng/mg each)





(*R*)-Zopiclone



(*S*)-Zopiclone
(Eszopiclone)

Courtesy of H. Miyaguchi, National Research Institute of Police Science.

J.Chromatogr. A 1519 (2017) 55-63.

Column	: CHIRAL ART Cellulose-SC (3 µm) 150 X 2.0 mmI.D.
Eluent	: 10 mM ammonium bicarbonate (pH 8.0 with aqueous ammonia)/acetonitrile (25/75)
Flow rate	: 0.2 mL/min
Temperature	: 25℃
Detection	: ESI, positive
Injection	: 10 µL (Hair sample extracted by micropulverized extraction)
Instrument	: LC) Ultimate™ 3000 liquid chromatograph (Thermo Fisher Scientific) HRMS) Q Exactive™ mass spectrometer (Thermo Fisher Scientific)

Worldwide Availability

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Karasuma Nishiiru Gojo-dori, Shimogyo-ku
Kyoto, 600-8106, Japan
TEL:+81-75-342-4515 FAX:+81-75-342-4550
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