Polysaccharide-based chiral HPLC phases for better performance

Kromasil® AmyCoat™
Kromasil® CelluCoat™

Designed to stretch the limits.

Kromasil® AmyCoat™ and Kromasil® CelluCoat™ stretch the limits for analytical and industrial chiral chromatography. The silica is based on an in-house developed matrix and coated with a functionalized amylose or cellulose selector. High resolution, excellent selectivity, no pressure limits* and stable performance when switching between compatible mobile phases are some important benefits.

ANALYTICAL CHROMATOGRAPHY

NO PRESSURE LIMITS ▶ HIGH FLOW RATES ▶ FASTER ANALYSES

SMALL PARTICLES (3 µm) ▶ HIGH RESOLUTION ▶ BETTER ANALYSES

UNIQUE COATING METHOD ▶ EXCELLENT SELECTIVITY ▶ BETTER ANALYSES

PREPARATIVE CHROMATOGRAPHY

UNIQUE SILICA MATRIX ▶ MECHANICALLY STRONG ▶ LONGER LIFETIME

WIDE RANGE OF PARTICLES ▶ CONSISTENT PERFORMANCE ▶ EASIER TO SCALE UP

UNIQUE COATING METHOD ▶ HIGHER LOADABILITY ▶ HIGHER PRODUCTIVITY

* Kromasil AmyCoat and Kromasil CelluCoat can withstand flow rates equivalent to pressures of up to 400 bar—i.e. the approximate limit for most HPLC systems.

Peak performance. Expect nothing less.

To speed up and simplify method development, we have removed some of the restrictions for coated polysaccharide phases. In analytical scale chromatography, 3 µm particles and the absence of pressure limits allow faster chromatography with better results than ever before.

BETTER RESULTS

Both Kromasil AmyCoat and Kromasil CelluCoat show great enantioselectivity for many different racemates. In a separate section of the brochure, you will find an application guide showing exactly the performance levels you can expect.

By having access to 3 µm particles, it enables a higher plate count and resolution for analytical chromatography. Combined with great selectivity, this facilitates the separation of the enantiomers.

FASTER RESULTS

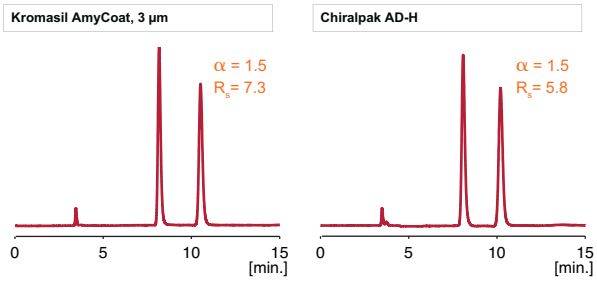
Not only can you get better results with Kromasil AmyCoat and Kromasil CelluCoat you also get them faster. Thanks to a product characteristic like the absence of pressure limits, you can run analytical chromatography at very high flow rates and save time.

The high selectivity and 3 µm particles are also important factors in speeding up the method. You achieve an improved resolution, which, in turn, allows a higher flow rate.

Kromasil® AmyCoat™ and Kromasil® CelluCoat™ are available in particle sizes down to 3 µm.

Kromasil® AmyCoat™

Selectivity and resolution comparison—Kromasil AmyCoat 3 µm and Chiralpak AD-H (5 µm).

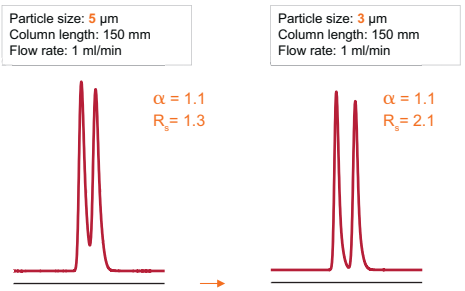


Common conditions
Solute: Carbinoxamine
Mobile phase: Heptane/2-Propanol/DEA (90/10/0.1)
Column size: 4.6 × 150 mm
Flow rate: 0.5 ml/min
Temperature: 22 °C
Detection: UV 226 nm

	α		R_S	
	AmyCoat 3 µm	**Chiralpak AD-H***	**AmyCoat 3 µm**	**Chiralpak AD-H***
Ambucetamide	1.4	1.4	4.8	4.2
Carbinoxamine	1.5	1.5	7.3	5.8
Ketoprofen	1.4	1.3	4.6	4.3
Naproxen	1.2	1.2	3.4	3.1
Oxamniquine	1.2	1.2	3.3	3.1
Proglumide	2.7	2.8	11.8	9.0
Sulindac	1.3	1.3	4.8	3.9

(* 5 µm)

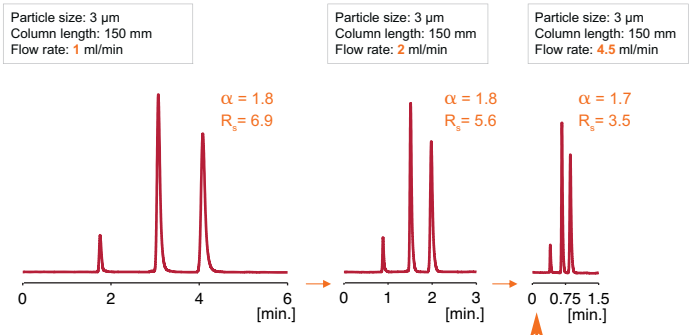
Difference in resolution—Kromasil AmyCoat 3 µm vs. 5 µm.



Common conditions
Solute: trans-2-Phenyl-1-cyclohexanol
Mobile phase: Heptane/2-Propanol (95/5)
Column diameter: 4.6 mm
Temperature: 25 °C
Detection: UV 220 nm

Baseline separation by using 3 µm particles

Fast analytical chromatography

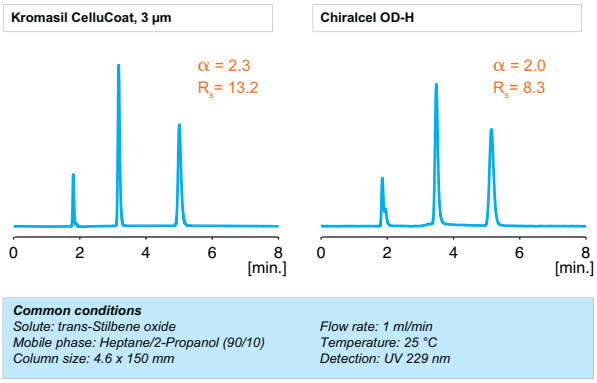


Common conditions
Solute: Tröger's base
Mobile phase: Heptane/2-Propanol/DEA (90/10/0.1)
Column diameter: 4.6 mm
Temperature: 25 °C
Detection: UV 220 nm

Baseline separation in less than 1 minute

Kromasil® CelluCoat™

Selectivity and resolution comparison—Kromasil CelluCoat 3 µm and Chiralcel OD-H (5µm).

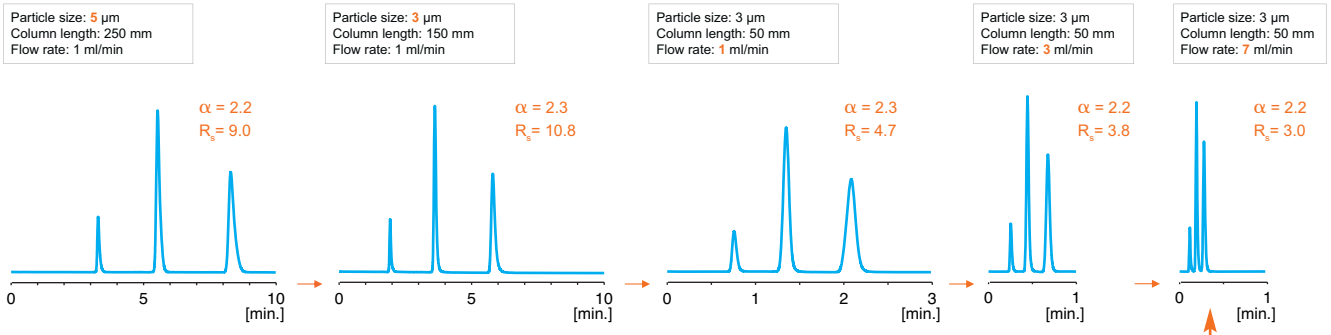


Common conditions
Solute: trans-Stilbene oxide
Mobile phase: Heptane/2-Propanol (90/10)
Column size: 4.6 x 150 mm
Flow rate: 1 ml/min
Temperature: 25 °C
Detection: UV 229 nm

	α		R_S	
	CelluCoat 3 µm	**Chiralcel OD-H***	**CelluCoat 3 µm**	**Chiralcel OD-H***
Trans-Stilbene oxide	2.3	2.0	13.2	8.3
Benzoin	1.5	1.5	8.6	5.7
TFAE	2.9	2.9	14.7	11
Tröger's base	1.4	1.4	3.7	2.7
Oxprenolol	5.6	5.5	18.1	15.1
Naproxen	1.2	1.2	2.9	2.2
Proglumide	2.0	2.0	7.6	3.2

*** (5 µm)**

Fast analytical chromatography



Common conditions
Solute: trans-Stilbene oxide
Mobile phase: Heptane/2-Propanol (90/10)
Column diameter: 4.6 mm
Temperature: 25 °C
Detection: UV 229 nm

Baseline separation in less than 30 seconds

Kromasil® AmyCoat™ and Kromasil® CelluCoat™ —faster results, better results.

Makes everyday work so much easier.

Kromasil AmyCoat and Kromasil CelluCoat let you perform method development without interference from restrictive parameters. Forget pressure limits, long equilibration times and degradation in performance when switching from one compatible mobile phase to another—they simply do not exist anymore.

NO PRESSURE LIMITS

User-friendliness, as we see it, is the ability to perform method development without being restricted by various parameters. One well-known restriction for coated polysaccharide phases is the general pressure limit over the bed. Kromasil AmyCoat and Kromasil CelluCoat withstand flow rates equivalent to pressures up to 400 bar—which is about the limit for the HPLC system itself. This makes it possible to run analytical chromatography a lot faster.

STABLE PERFORMANCE

From a stability perspective, you can run Kromasil AmyCoat and Kromasil CelluCoat using compatible normal, polar organic and reversed mobile phases. Switching between compatible normal to polar organic mobile phases will not lead to any degradation in performance, no need for solvent dedicated columns.

To show the stability in column efficiency for Kromasil CelluCoat, we have performed mobile phase switches and visualized them after each switch with a Knox plot.

SHORT EQUILIBRATION TIMES

Column equilibration is a time-consuming activity when running chiral chromatography. Higher flow rates allow Kromasil AmyCoat and Kromasil CelluCoat to show substantially shorter equilibration times than other coated phases on the market.

In general, long equilibration times are most pronounced when switching mobile phases containing basic additives to acidic additives or the other way around. The test with a Kromasil CelluCoat 3 µm column switching between two compatible mobile phases shows how short equilibration times you can get.

There are also two tests illustrating short equilibration times and additive switch for both Kromasil AmyCoat and Kromasil CelluCoat with absolutely no sign of memory effects.

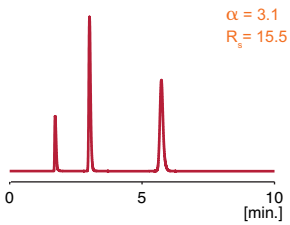
Kromasil® AmyCoat™

Stable performance—No pressure limits—Freedom to switch solvents

Identical result — Identical result

Before

Solute: trans-Stilbene oxide

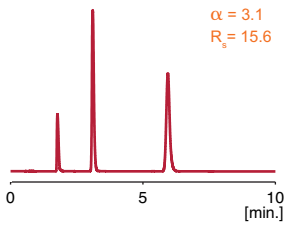


Test sequence

Mobile phase	Flow rate [ml/min]	Run time [h]	Total back-pressure [bar]
1. Heptane/2-Propanol (90/10)	4.3	2	345
2. 2-Propanol	0.7	2	260
3. Acetonitrile	1	2	58
4. Ethanol	1	2	188
5. Heptane/2-Propanol (90/10)	1	2	72

After

Solute: trans-Stilbene oxide

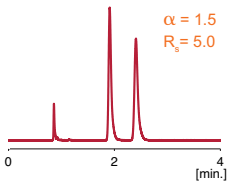


Common conditions
Stationary phase: Kromasil AmyCoat, 3 µm
Column size: 4.6 × 150 mm
Temperature: 25 °C
Mobile phase: Heptane/2-Propanol (90/10)
Flow rate: 1 ml/min
Detection: UV 229 nm

Short equilibration times—Freedom to switch additives

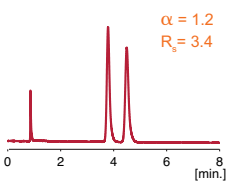
Identical result — Identical result

Mobile phase 1
Solute: Carbinoxamine
Detection: UV 228 nm



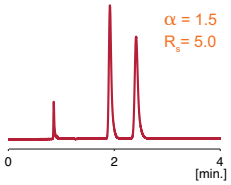
Equilibration
Mobile phase 2
Duration: 18 min

Mobile phase 2
Solute: Ketoprofen
Detection: UV 250 nm



Equilibration
Mobile phase 1
Duration: 12 min

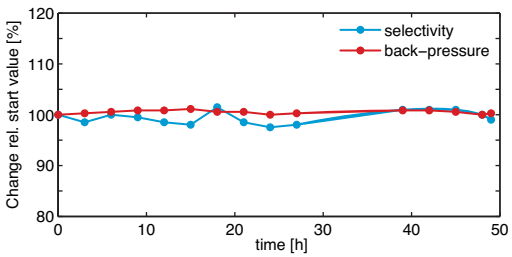
Mobile phase 1
Solute: Carbinoxamine
Detection: UV 228 nm



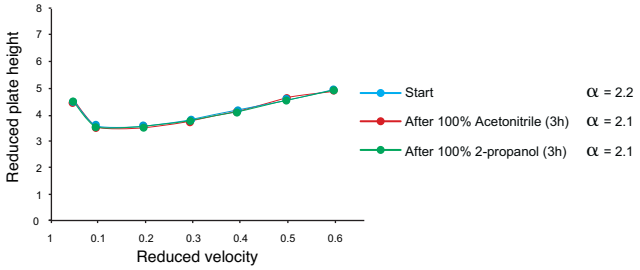
Common conditions
Stationary phase: Kromasil AmyCoat, 3 µm
Column size: 4.6 x 150 mm
Mobile phase 1: Heptane/2-Propanol/DEA (90/10/0.1)
Mobile phase 2: Heptane/2-Propanol/TFA (90/10/0.1)
Flow rate: 2 ml/min
Temperature: 25 °C

Kromasil® CelluCoat™

Stable performance—No pressure limits—Freedom to switch solvents

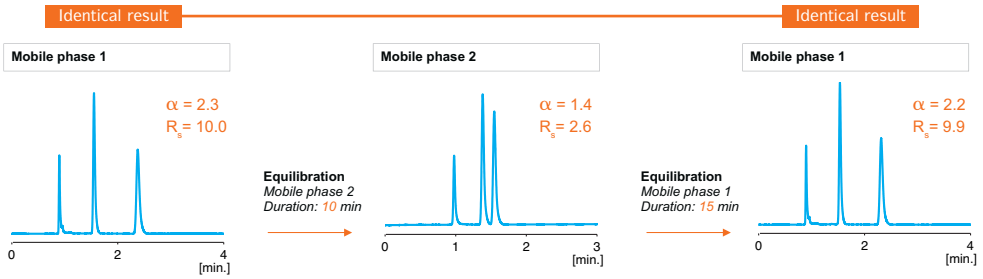


Conditions
Solute: trans-Stilbene oxide
Stationary phase: Kromasil CelluCoat, 3 µm
Column size: 4.6 x 50 mm
Mobile phase: Heptane/2-Propanol (90/10)
Flow rate: 7 ml/min
Temperature: 25 °C



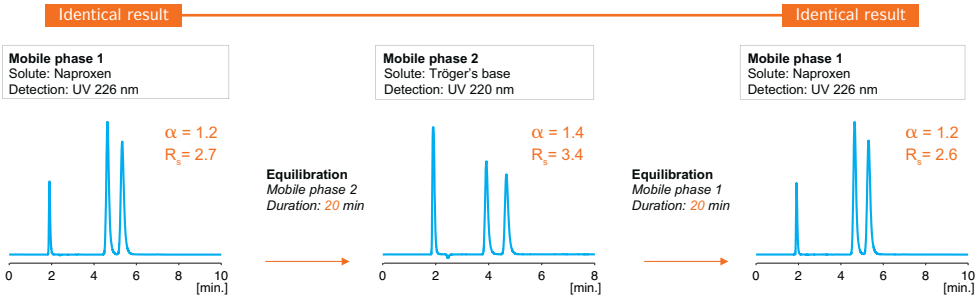
Common conditions
Solute: trans-Stilbene oxide
Stationary phase: Kromasil CelluCoat, 5 µm
Column size: 4.6 x 250 mm
Mobile phase: Heptane/2-Propanol (90/10)
Flow rates: 0.1-1.2 ml/min
Temperature: 25 °C

Short equilibration times—Freedom to switch solvents



Common conditions
Solute: trans-Stilbene oxide
Detection: UV 229 nm
Stationary phase: Kromasil CelluCoat, 3 µm
Column size: 4.6 x 150 mm
Mobile phase 1: Heptane/2-Propanol (90/10)
Mobile phase 2: Ethanol
Flow rate: 2 ml/min
Temperature: 25 °C

Short equilibration times—Freedom to switch additives



Common conditions
Stationary phase: Kromasil CelluCoat, 3 µm
Column size: 4.6 x 150 mm
Mobile phase 1: Heptane/2-Propanol/TFA (90/10/0.1)
Mobile phase 2: Heptane/2-Propanol/DEA (90/10/0.1)
Flow rate: 1 ml/min
Temperature: 25 °C


Kromasil®

Works all the way.

Kromasil products are well known for their ability to work along the whole spectrum from analytical to industrial scale chromatography. Kromasil AmyCoat and Kromasil CelluCoat are no exception.

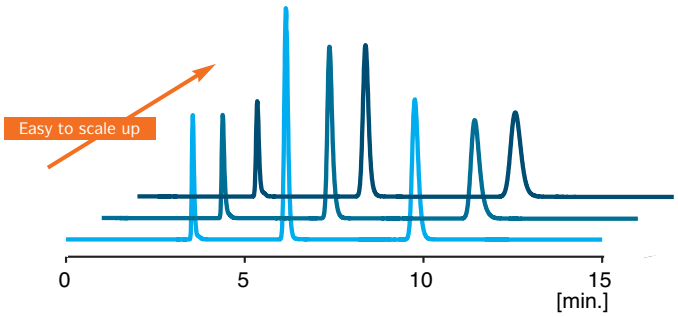
SIMPLIFIES METHOD DEVELOPMENT

With particle sizes from 3 µm to 10 µm giving identical selectivity, Kromasil AmyCoat and Kromasil CelluCoat make it easy to scale up while retaining excellent performance.

As for all Kromasil products, you can perform the required method development in analytical scale columns and then scale up to a larger column.

You can, for example, use 3 µm particles in an analytical scale column and translate all the generated data to a larger column packed with 10 µm particles.

If you plan to scale up the process, we suggest you use an analytical column packed with 10 µm particles right from the start.

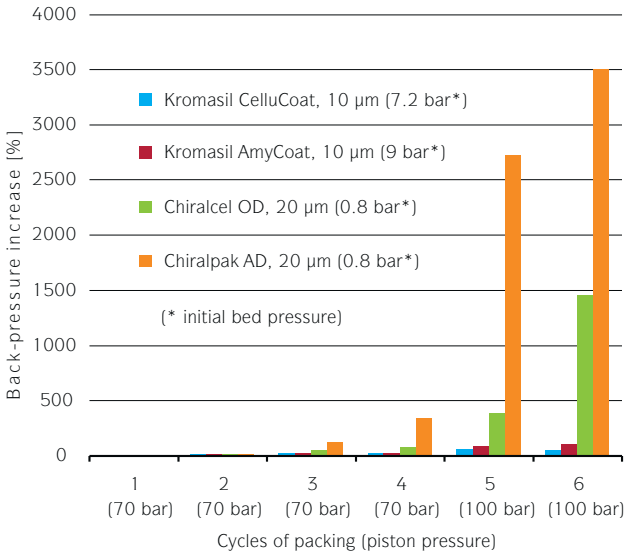


- Kromasil 3-CelluCoat α = 2.4 R_s = 13.9
- Kromasil 5-CelluCoat α = 2.4 R_s = 11.4
- Kromasil 10-CelluCoat α = 2.4 R_s = 10.0

Common conditions
Column size: 4.6 × 150 mm
Mobile phase: Heptane/2-Propanol (90/10)
Flow rate: 0.5 ml/min
Temperature: 25 °C
Solute: trans-Stilbene oxide
Detection: UV 229 nm

MECHANICALLY STRONG

Mechanical strength is an important product lifetime parameter. Kromasil AmyCoat and Kromasil CelluCoat have a mechanically strong spherical silica which withstands repeated cycles of packing.



N.B. The relative back-pressure increase is a measure of the degree of degradation of the material after repeated packings. Actual particle size for Chiralcel and Chiralpak is about 3 times larger than that for Kromasil, which explains the difference in initial back pressure (back-pressure is inversely proportional to the square of the particle size).

The test was designed to exert greater than normal mechanical stress on the chiral stationary phases, and is performed at a packing pressure above the maximum 50 bar recommended by the manufacturer of Chiralcel OD and Chiralpak AD.

FULLY BACK-INTEGRATED

We manufacture the super wide pore silica for Kromasil polysaccharide products and perform all subsequent steps leading to the final product. This means you get a product with full traceability.

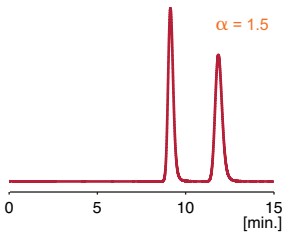
Every manufacturing step is ensured through our detailed quality system, and the final product is never released until it has passed our rigorous quality control tests. Having all the manufacturing steps in-house also gives us a strong position in terms of production capacity.

Kromasil® AmyCoat™

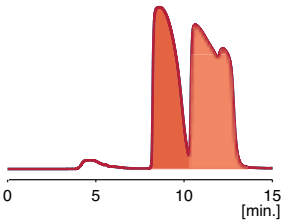
Preparative applications

Carbinoxamine
Mobile phase: Heptane/2-Propanol/DEA (90/10/0.1)
Flow rate: 0.7 ml/min

Analytical injection
Sample size: 10 µg
Detection: UV 254 nm



Preparative injection
Sample size: 7.5 mg
Detection: UV 280 nm



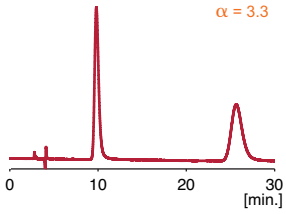
	Enantiomer 1	Enantiomer 2
Purity [%]	100	99.7
Yield [%]	99.7	100

Equivalent loading on a 50 × 250 mm column:

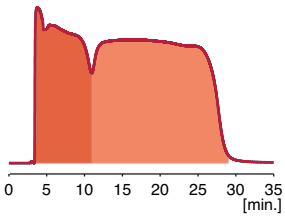
0.9 g

Warfarin
Mobile phase: Heptane/2-Propanol (85/15)
Flow rate: 1 ml/min

Analytical injection
Sample size: 8.5 µg
Detection: UV 230 nm



Preparative injection
Sample size: 17.1 mg
Detection: UV 325 nm



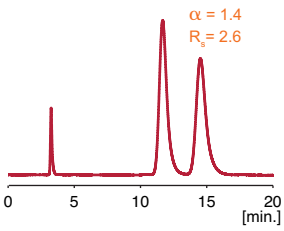
	Enantiomer 1	Enantiomer 2
Purity [%]	99.7	99.5
Yield [%]	99.4	99.7

2.0 g

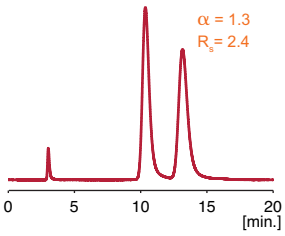
Common conditions
Stationary phase: Kromasil AmyCoat 10 µm
Column size: 4.6 x 250 mm
Temperature: 25 °C

EASY TO SCALE UP

Conditions:
Column size: 4.6 × 150 mm
Flow rate: 0.5 ml/min

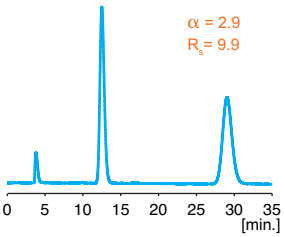


Conditions:
DAC system: NovaSep Pack-n-Sep, 50 mm i.d.
Bed length: 135 mm
Flow rate: 60 ml/min

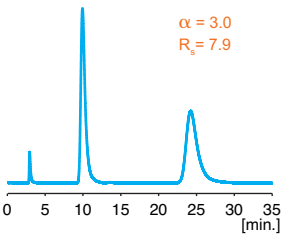


Common conditions
Stationary phase: Kromasil AmyCoat, 10 µm
Mobile phase: Heptane/2-Propanol (90/10)
Solute: Trifluoro-anthrylethanol
Detection: UV 254 nm
Temperature: 20 °C

Conditions:
Column size: 4.6 × 150
Flow rate: 0.5 ml/min



Conditions:
DAC system: NovaSep Pack-n-Sep, 50 mm i.d.
Bed length: 132 mm
Flow rate: 60 ml/min



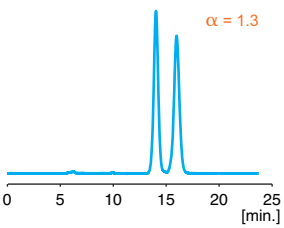
Common conditions
Stationary phase: Kromasil CelluCoat, 10 µm
Mobile phase: Heptane/2-Propanol (90/10)
Solute: Trifluoro-anthrylethanol
Detection: UV 254 nm
Temperature: 20 °C

Kromasil® CelluCoat™

Loadability comparison

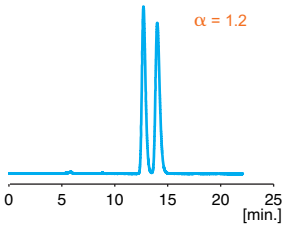
Kromasil CelluCoat, 10 µm

Analytical injection: 20 µg



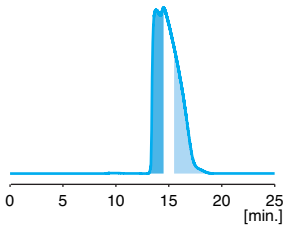
Chiralcel OD, 10 µm

Analytical injection: 20 µg



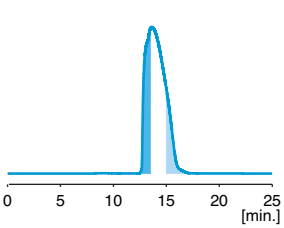
Kromasil CelluCoat, 10 µm

Preparative injection: 5 mg
Collected fractions size: 0.5 min



Chiralcel OD, 10 µm

Preparative injection: 5 mg
Collected fractions size: 0.5 min



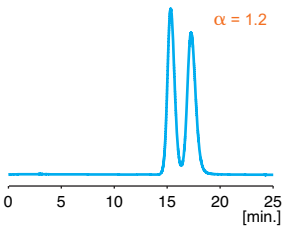
	Enantiomer 1		Enantiomer 2	
	Purity [%]	Yield [%]	Purity [%]	Yield [%]
Kromasil CelluCoat	91.2	73.3	94.4	50.1
Daicel Chiralcel OD	91.4	46.7	96.6	24.9

Common conditions
Solute: Naproxen
Mobile phase: Heptane/2-Propanol/TFA (90/10/0.1)
Column size: 4.6 x 250 mm
Temperature: 25 °C
Flow rate: 0.5 ml/min

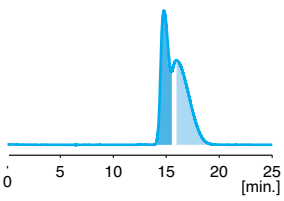
Preparative applications

Binaphtol
Mobile phase: Heptane/2-Propanol (90/10)

Analytical injection
Sample size: 10 µg
Detection: UV 223 nm



Preparative injection
Sample size: 1 mg
Detection: UV 350 nm



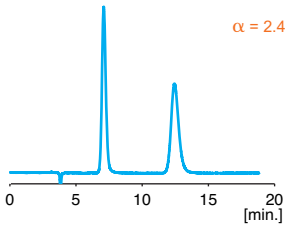
	Enantiomer 1	*Enantiomer 2*
Purity [%]	*95.4*	*97.8*
Yield [%]	*91.7*	*72.8*

Equivalent loading on a 50 × 250 mm column:

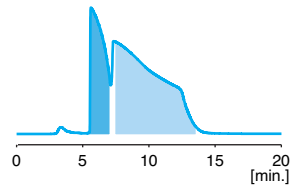
0.1 g

Metoprolol
Mobile phase: Heptane/2-Propanol/DEA (90/10/0.1)

Analytical injection
Sample size: 10 µg
Detection: UV 223 nm



Preparative injection
Sample size: 20 mg
Detection: UV 290 nm



	Enantiomer 1	*Enantiomer 2*
Purity [%]	*100*	*99.7*
Yield [%]	*97.9*	*88.1*

2.4 g

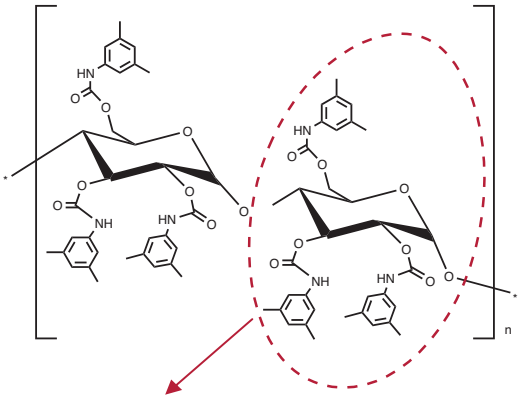
Common conditions
Stationary phase: Kromasil CelluCoat, 10 µm
Column size: 4.6 x 250 mm
Temperature: 25 °C
Flow rate: 1 ml/min

Taking a closer look.

Kromasil® AmyCoat™

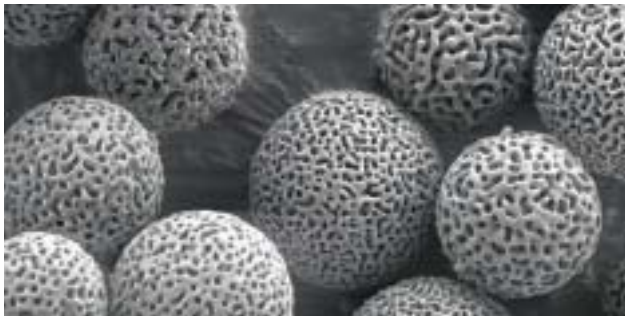
CHIRAL SELECTOR

The coated selector is tris-(3,5-dimethylphenyl) carbamoyl amylose.



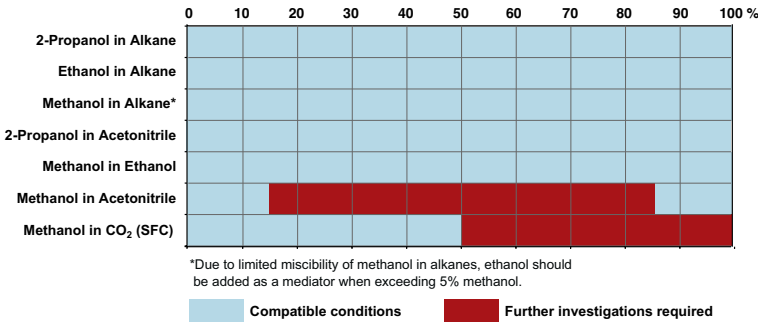
tris-(3,5-dimethylphenyl)carbamoyl amylose

PARTICLE SIZES



Kromasil AmyCoat is available in 3 and 5 µm as pre-packed columns, and in 10 µm as pre-packed column and bulk material.

COMPATIBLE MOBILE PHASES



Before testing conditions not mentioned, please contact the Kromasil application group, kromasil@eka.com

PRODUCT ASSORTMENT*

	3 µm - AmyCoat	5 µm - AmyCoat	10 µm - AmyCoat
4.6 x 50 mm	Kromasil 3-AmyCoat 4.6 x 50 mm	Kromasil 5-AmyCoat 4.6 x 50 mm	—
4.6 x 150 mm	Kromasil 3-AmyCoat 4.6 x 150 mm	Kromasil 5-AmyCoat 4.6 x 150 mm	Kromasil 10-AmyCoat 4.6 x 150 mm
4.6 x 250 mm	Kromasil 3-AmyCoat 4.6 x 250 mm	Kromasil 5-AmyCoat 4.6 x 250 mm	Kromasil 10-AmyCoat 4.6 x 250 mm
10 x 250 mm	—	Kromasil-5-AmyCoat 10 x 250 mm	Kromasil-10-AmyCoat 10 x 250 mm
21.2 x 250 mm	—	Kromasil 5-AmyCoat 21.2 x 250 mm	Kromasil 10-AmyCoat 21.2 x 250 mm

* Other column dimensions available upon request.

PRODUCT CODES

Kromasil X-AmyCoat followed by column diameter and length. X indicates particle size: 3, 5 or 10 µm. For example: *Kromasil 3-AmyCoat 4.6 x 150 mm*


Kromasil®
CelluCoat™

ORDERING INFORMATION

Order online at:
www.kromasil.com/online
kromasil@eka.com

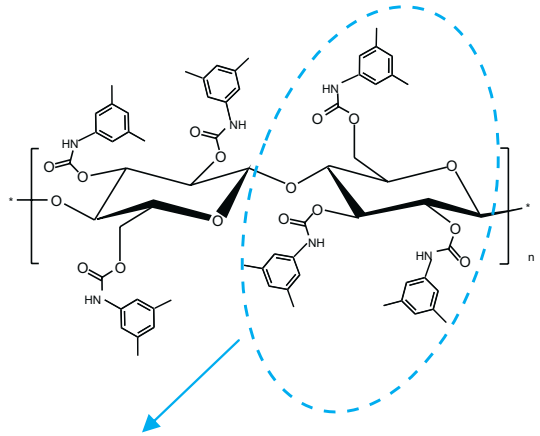
Or contact:
Eka Chemicals, Separation Products,
SE-445 80 Bohus, Sweden

Tel. +46 31 58 73 60
Fax. +31 58 77 27

Kromasil® CelluCoat™

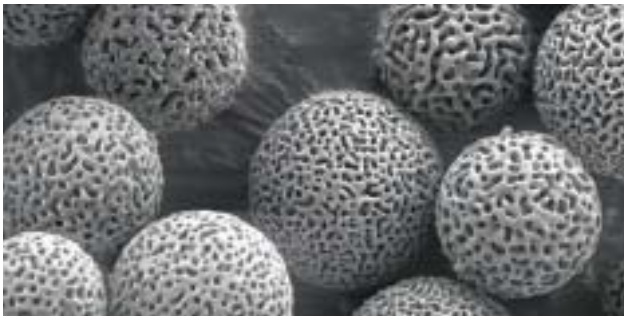
CHIRAL SELECTOR

The coated selector is tris-(3,5-dimethylphenyl) carbamoyl cellulose.



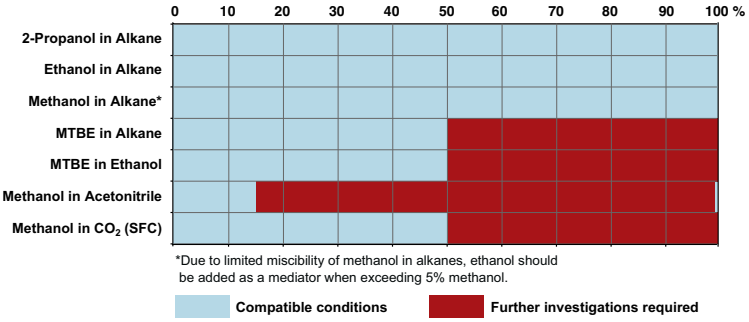
tris-(3,5-dimethylphenyl)carbamoyl cellulose

PARTICLE SIZES



Kromasil CelluCoat is available in 3 and 5 µm as pre-packed columns, and in 10 µm as pre-packed column and bulk material.

COMPATIBLE MOBILE PHASES



Before testing conditions not mentioned, please contact the Kromasil application group, kromasil@eka.com

PRODUCT ASSORTMENT*

	3 µm - CelluCoat	5 µm - CelluCoat	10 µm - CelluCoat
4.6 x 50 mm	Kromasil 3-CelluCoat 4.6 x 50 mm	Kromasil 5-CelluCoat 4.6 x 50 mm	—
4.6 x 150 mm	Kromasil 3-CelluCoat 4.6 x 150 mm	Kromasil 5-CelluCoat 4.6 x 150 mm	Kromasil 10-CelluCoat 4.6 x 150 mm
4.6 x 250 mm	Kromasil 3-CelluCoat 4.6 x 250 mm	Kromasil 5-CelluCoat 4.6 x 250 mm	Kromasil 10-CelluCoat 4.6 x 250 mm
10 x 250 mm	—	Kromasil-5-CelluCoat 10 x 250 mm	Kromasil-10-CelluCoat 10 x 250 mm
21.2 x 250 mm	—	Kromasil 5-CelluCoat 21.2 x 250 mm	Kromasil 10-CelluCoat 21.2 x 250 mm

* Other column dimensions available upon request.

PRODUCT CODES

Kromasil X-CelluCoat followed by column diameter and length. X indicates particle size: 3, 5 or 10 µm. For example: *Kromasil 3-CelluCoat 4.6 x 150 mm*