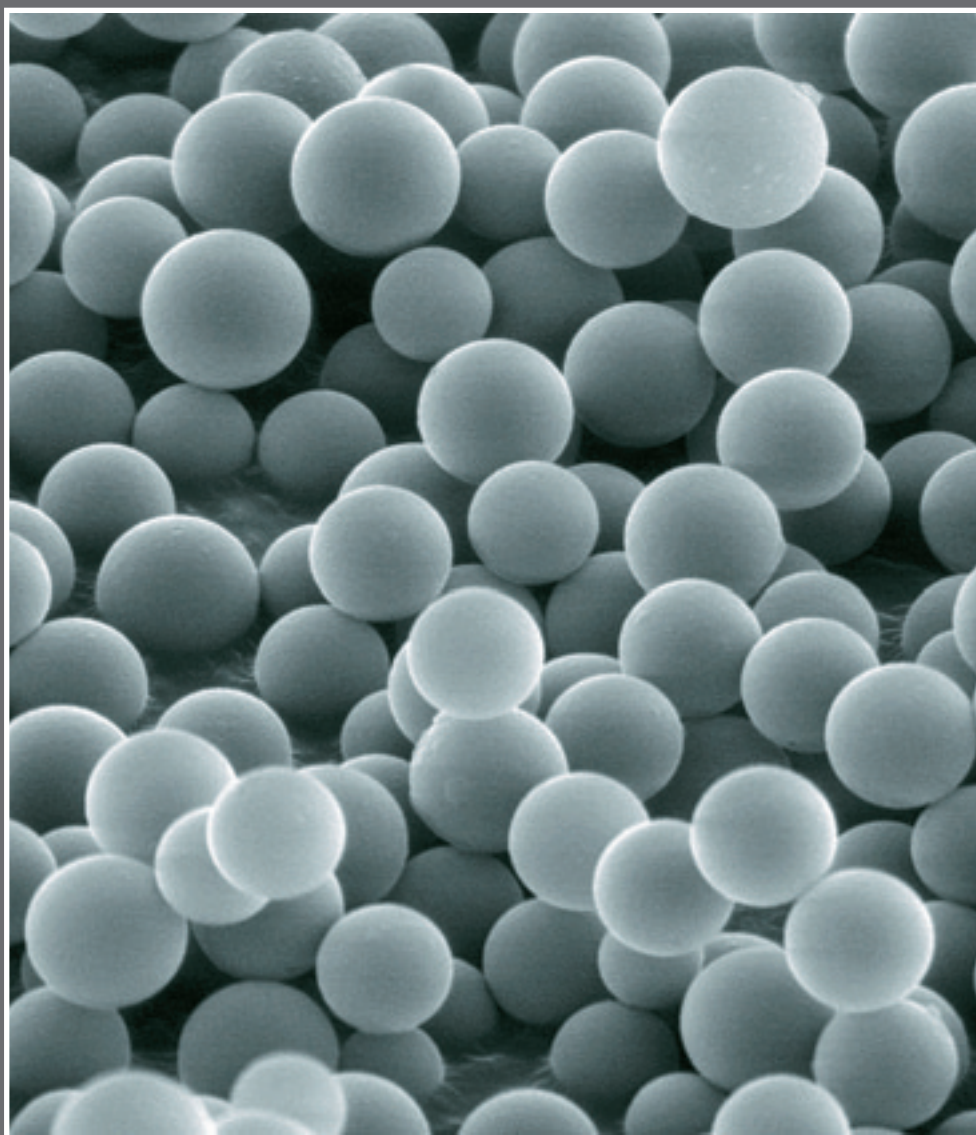


The technical evidence



Kromasil®

*The way to peak performance
in liquid chromatography*

Kromasil has proven to be the way to high performance, best total economy and problem-free chromatography.

Let us with facts and figures show you why.

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Introduction to Kromasil packings

Kromasil silica packings are designed to meet the highest demand in HPLC, SFC and SMB from analytical to process scale.

The uniqueness of Kromasil high performance spherical silica is the combination of:

- high surface area
- mechanical strength

Other outstanding properties are:

- chemical purity
- chemical stability
- optimized surface properties
- well-defined pore structure

Kromasil HPLC silica consists of perfectly spherical, totally porous particles. They are produced in sizes of 3.5, 5, 7, 10, 13 and 16 μm (larger particles can be produced upon request) and with a narrow particle size distribution for high efficiency, low pressure drop and best total economy in chromatographic purifications.

In figures 1 and 2, the SEM photographs of Kromasil 3.5 μm and 10 μm are shown.

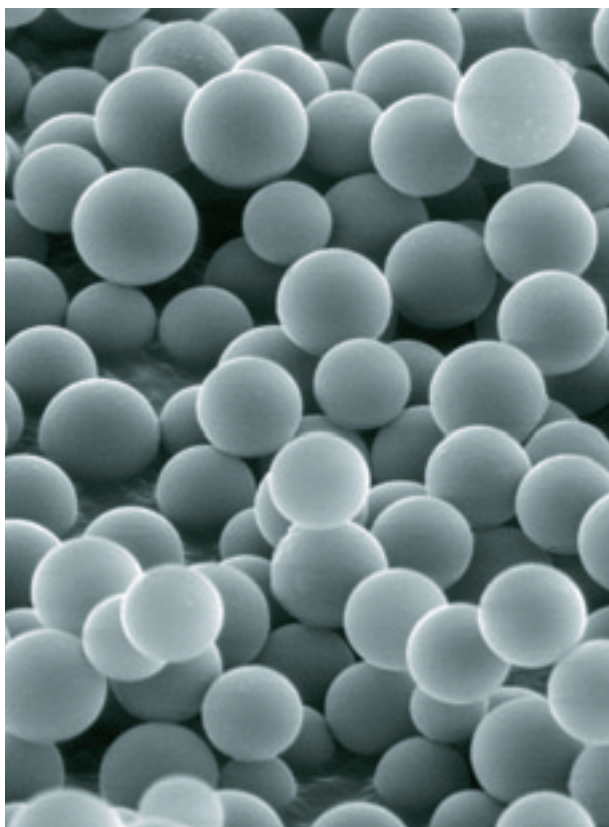


Figure 1 | Kromasil 3.5 μm

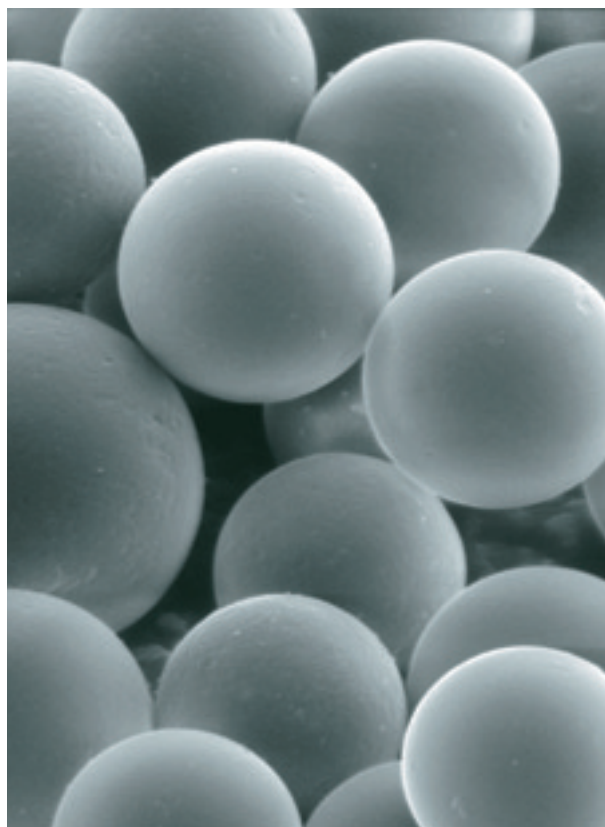


Figure 2 | Kromasil 10 μm

Batch to batch reproducibility

The manufacturing of Kromasil spherical silica is done according to the well-known sol-gel technique which gives optimized chemical and mechanical stability, pore structure and reproducible surface area.

Development, production and marketing of the Kromasil packings are ISO 9001 certified.

Extensive control and testing is performed through the whole production process, ensuring the highest possible reproducibility. Proof of this can be seen in figures 3 and 4, showing the reproducibility of batches of Kromasil.

Kromasil packings are manufactured in batches over 100 kg, in a modern plant with capacity of several tonnes per year.

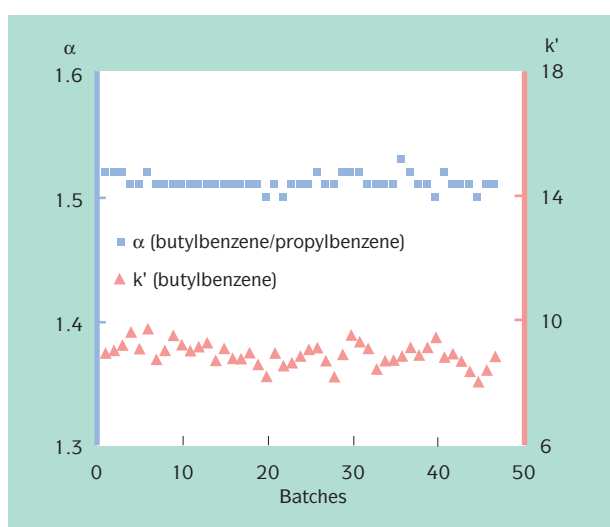


Figure 3 | Batch to batch reproducibility of 50 batches of Kromasil C18 with respect to k' and α .

Conditions:
Solvent: 70% acetonitrile, 30% water · Flow: 2 ml/min. · UV: 254 nm
Column: 4.6 × 250 mm

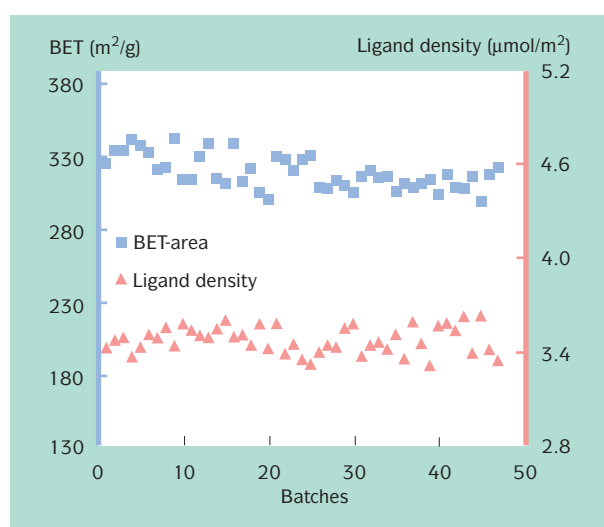


Figure 4 | Batch to batch reproducibility of 50 batches of Kromasil C18 with respect to BET and ligand density.

Conditions:
Solvent: 70% acetonitrile, 30% water · Flow: 2 ml/min. · UV: 254 nm
Column: 4.6 × 250 mm

The importance of mechanical strength in preparative HPLC, SFC and SMB

Why high mechanical strength?

In modern HPLC, SFC and SMB systems small efficient particles are used for the best total economy. Columns have to be packed at high piston pressure to achieve optimum efficiency. Further, high mobile phase velocity is used for high throughput. As a result, high back pressure is developed in the system. In large diameter dynamic axial compression (DAC) columns, the mechanical stress on the particles can be significant, and a very high mechanical strength is crucial. In addition, one column is frequently used for several pharmaceutical products, where the packing has to be dedicated to one product. The column therefore has to be unpacked and repacked for every new campaign, putting high demands on the mechanical strength of the packing. Less strong packings break under these conditions. They form fines which clog the frits and cause an uneven flow distribution in the column which lower the efficiency. At the end, very high pressure is developed in the system, and the column has to be repacked with new material.

**MECHANICAL STRENGTH IS CRUCIAL FOR
THE LIFETIME OF THE PACKING AND FOR
A PROBLEM-FREE PROCESS**

What influences mechanical strength?

Mechanical strength of silica HPLC packings is influenced by:

- particle shape
- pore volume
- pore diameter
- treatment of the material

Spherical particles are stronger than irregular ones. Large pore volume and large pore diameter mean a weaker silica matrix and fewer contact points between the primary particles giving lower mechanical strength. The larger the pore, the lower the mechanical strength.

In Kromasil particles, the pore volume is optimized to give the highest surface area without losing mechanical strength. This unique combination is achieved by special treatment of the material in several production steps.

Proof of Kromasil mechanical strength

The mechanical strength of every batch of Kromasil silica is tested by a unique method developed by Eka Chemicals.

The particles are packed in a preparative column (50 mm I.D.) with a short bed (50 mm) and axial compression. The piston pressure is increased step by step from 50 bar all the way up to 300 bar.

Piston pressure is then released completely and a new series is repeated. In figure 5, the increase in bed pressure drop between two series, of Kromasil 60 Å and 100 Å and other commercial materials, is illustrated. In figures 6 and 7 particle size analysis, of Kromasil and other commercial materials after performed mechanical strength test, is shown.

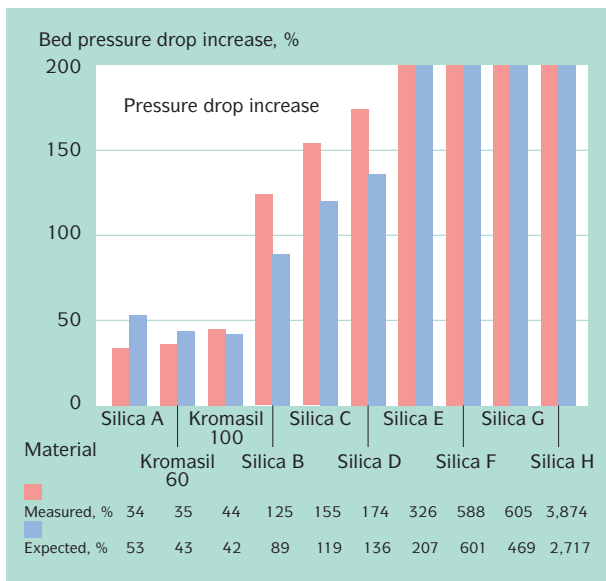


Figure 5 | Bed pressure drop increase after one compression cycle for Kromasil and some other commercial materials. Materials showing a higher measured bed pressure drop increase than expected, crash during the test. The four materials to the right show a very high pressure drop increase of more than 200%.

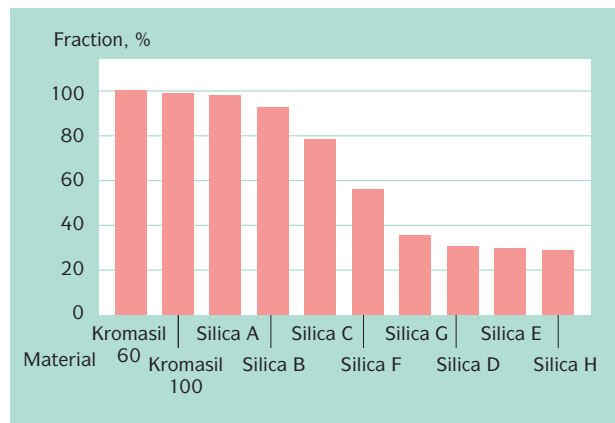


Figure 6 | Particle diameter (median by number) for the used packing materials, compared to the virgin material value. 100% means no degradation. The particle size analysis was performed on a Coulter Counter.

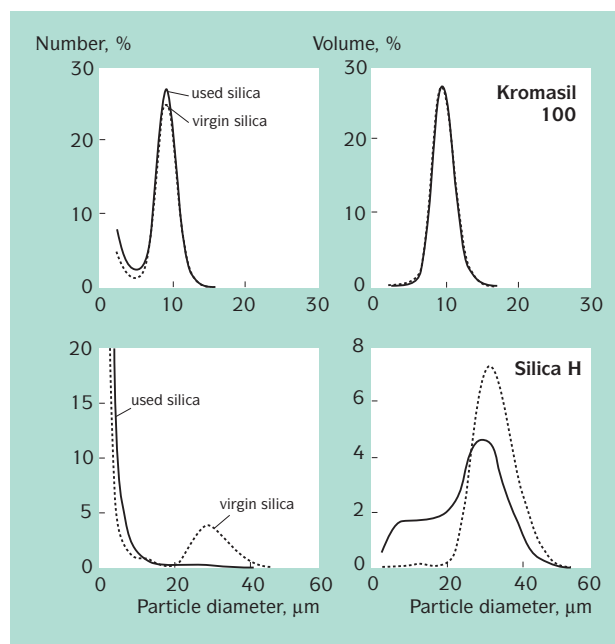


Figure 7 | Particle size analysis of virgin (dotted) and used (solid) silica. Kromasil: The used material is very slightly affected, as seen in the lower diameter region. Silica H: The used material consists mainly of crushed particles, giving rise to an extremely high pressure drop.

What you should know about chemical stability

Some silica-based materials may be sensitive to hydrolysis and dissolution under low and high pH conditions respectively.

What influences hydrolysis of bonded phases at low pH?

Surface silanols

The surface of Kromasil consists of uniformly distributed, relatively neutral silanol groups. The number of unwanted, acidic silanols are minimized.

Coating density of the silane

High surface coverage gives higher chemical stability. In this respect it is interesting to remember that modification of the silica surface with mono-

functional silanes also gives higher surface coverage and reproducibility than with polyfunctional silanes. Kromasil bonded phases are manufactured with monofunctional silanes. In figure 8, Kromasil C8 is compared with other commercial materials in terms of chemical stability under low pH conditions.

What influences dissolution of silica material at high pH?

The manufacturing method

Materials produced by the sol-gel technique are more stable than “spongy” ones which are produced by reacting organo-silicates under basic conditions and gelling the resulting silicic acid in situ.

Surface treatment of the silica

The methods are many and generally patented.

Coating density of the silane

See the previous comments under “Stability at low pH conditions”.

Kromasil fulfils high requirements for excellent chemical stability at high pH conditions, which is demonstrated by the ability of the material to withstand treatment under extremely harsh conditions for silica-based packings.

This is exemplified in figure 9 for the regeneration of a column used for the purification of insulin, with NaOH at $\text{pH} > 13$.

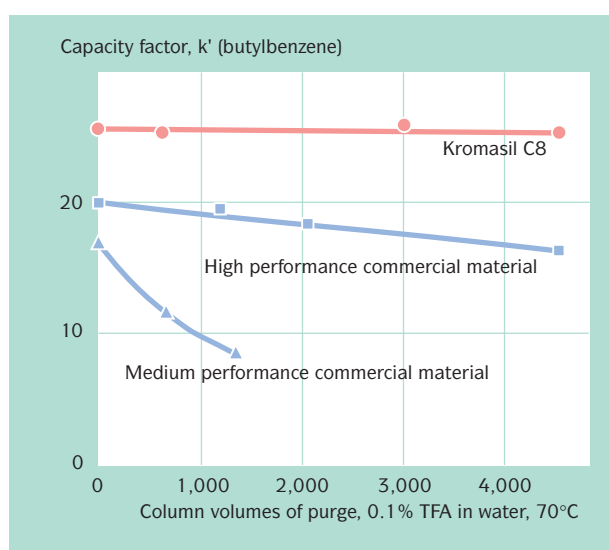


Figure 8 | Values of k' for butylbenzene plotted against the number of column volumes of purge.

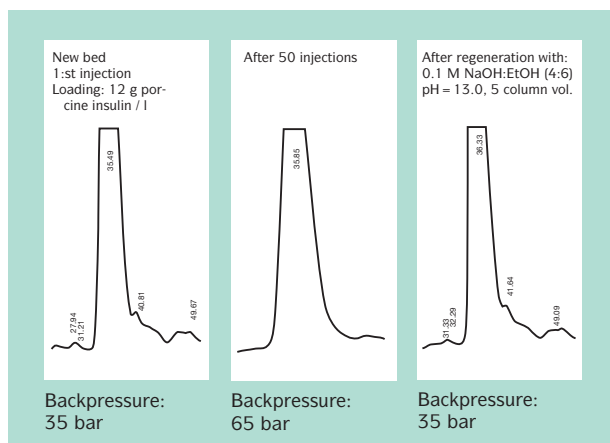


Figure 9 | Regeneration of a Kromasil column contaminated with polymeric insulin, at pH > 13.

In table 1, the leakage of silica and bonded phase after the treatment at pH > 13, is shown.

The advantages of using chemically stable silica-based materials are:

- Longer lifetime which gives better total economy
- Small changes in retention time and adsorption characteristics
- Less contamination of your product by leakage from the silica matrix or the silane ligands

In table 2 you can see the low degree of leakage of bonded phase and silica from Kromasil phases under different mobile phase conditions.

Phase	Purged volume (column volumes)	Amount of Si in mobile phase (ppm)
C4	1 – 2	105
C8		93
C4	3 – 4	74
C8		71
C4	5 – 6	64
C8		61
C4	7 – 8	58
C8		56
C4	9 – 10	55
C8		54

Table 1 | Leakage of bonded phase and silica from Kromasil phases at pH > 13.

Conditions:
 Carbon content: C4: 7.7% carbon (w/w), C8: 11.8% carbon (w/w)
 Columns: 4.6 × 250 mm (new columns)
 Eluent: n-propanol: 0.1 M NaOH (7 : 3 v/v) · Flow rate: 1.0 ml/min.
 Total volume: 41.5 ml (= 10 column volumes)
 Detection method: Atomic absorption (Si) · Detection limit: 0.5 ppm

Mobile phase	Purged volume (column volumes)	Amount of Si in mobile phase (ppm)	
		pH 8	pH 2
1	17	1.1	< 0.5
1	83	0.5	< 0.5
2	17	2.3	0.7
1	83	< 0.5	< 0.5
2	17	1.8	0.7
1	83	< 0.5	< 0.5
2	17	3.6	0.6

Table 2 Leakage of bonded phase and silica from Kromasil C8 at two different mobile phase pH, 8 and 2.

Conditions, pH 8:
 Column: 4.6 × 250 mm (new column) · Mobile phase 1: n-propanol : buffer (10 : 90) · Mobile phase 2: n-propanol : buffer (70 : 30)
 Buffer: NH₂Ac (0.2 M)/NH₃, pH = 8.0 · Flow rate: 0.5 ml/min.
 Total volume: 1,315 ml (317 column volumes)
 Detection method: Atomic abs. (Si) · Detection limit: 0.5 ppm

Conditions, pH 2:
 Column: 4.6 × 250 mm (new column) · Mobile phase 1: n-propanol:H₂O:TFA (10:90:0.1) · Mobile phase 2: n-propanol:H₂O:TFA (70:30:0.1)
 Flow rate: 0.5 ml/min. · Total volume: 1,315 ml (317 column volumes) ·
 Detection method: Atomic abs. (Si) · Detection limit: 0.5 ppm

Surface properties influence your separations

Chromatographic purifications are influenced by the surface properties of the stationary phase. Purification of difficult types of compounds like amines, basic peptides and chelating compounds is influenced by the following parameters:

1. Hydrophobicity

Hydrophobicity determines the separation power of HPLC materials when hydrophobic interactions are dominating. High surface coverage and type of ligand influence this parameter. How selectivity is influenced by the stationary phase hydrophobicity, is shown in figure 10.

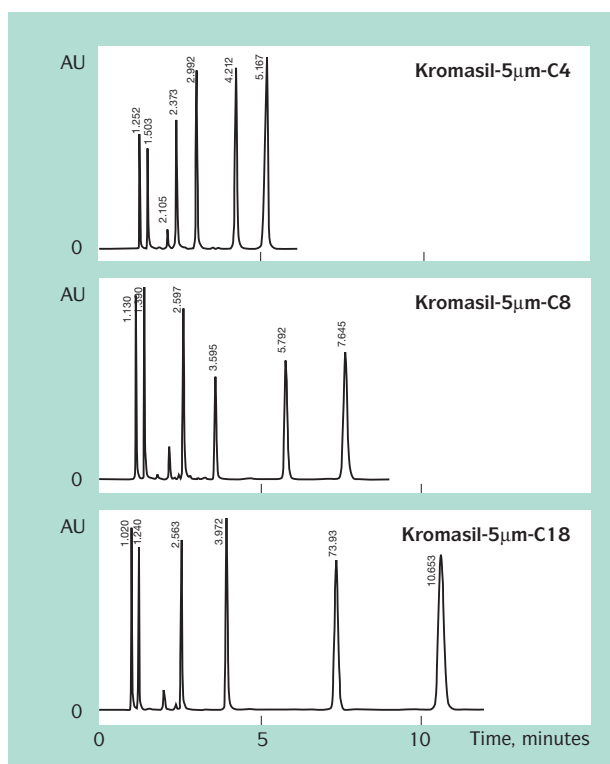


Figure 10 | Shows the increase in separation time of a mixture of substances due to increased hydrophobicity of the stationary phase (Kromasil C4, C8 and C18).

Sample:

Uracil, benzamide, methyl benzoate, toluene, propyl benzene, butyl benzene.

Conditions:

Eluent: ACN/H₂O (70/30) · Flow: 2 ml/min. · Column: 4.6 × 250 mm
UV: 254 nm

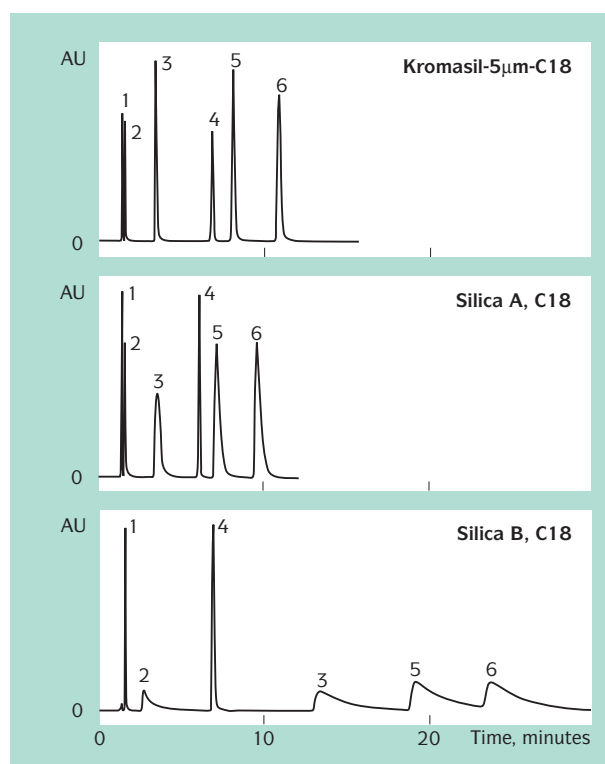


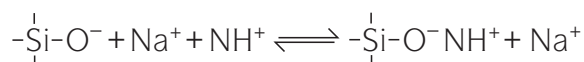
Figure 11 Separation of a mixture of antidepressants and toluene as hydrophobic reference with Kromasil C18, a comparable, high quality commercial material and a low quality commercial one.

Sample: 1. Uracil, 2. Phenylpropanol amine (3.0 µg), 3. Nortriptyline (1.75 µg), 4. Toluene (3.0 µg), 5. Imipramine (3.9 µg) and 6. Amitriptyline (3.0 µg)

Conditions: Eluent: 60% acetonitrile and 40% 10 mM sodium phosphate, pH 7.0 · Flow: 1.5 ml/min. · UV: 215 nm · Column: 4.6 × 250 mm · Temp.: 40 °C

2. Undesired ion exchange interactions

The interaction of basic samples with acidic silanols is mainly an ion exchange process:



These strong interactions may cause undesired tailing when separating basic compounds, such as tricyclic antidepressants.

To illustrate this, the separation of a mixture of tricyclic antidepressants, and toluene as a hydrophobic reference, is shown in figure 11 for Kromasil and other commercial materials.

3. Metal impurities in the stationary phase

Metal impurities in the silica structure affect the acidity of silanols, creating non-homogeneous structures which strongly complex with chelating compounds.

For this reason, metal impurities must be carefully monitored in silica-based materials. In figure 12, the content of metal impurities of Kromasil and other commercial materials is shown.

The chromatographic purification of the chelating compound 2,2'-bipyridyl with Kromasil C8 and another commercial material is shown in figure 13. Note that for Silica A, only the non-chelating reference, 4,4'-bipyridyl is eluted and the chelating compound is irreversibly adsorbed.

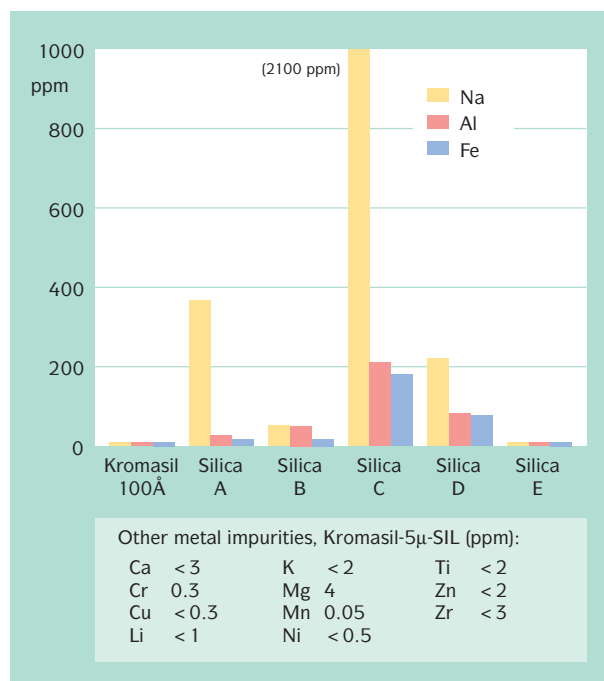


Figure 12 | Content of metal impurities of Kromasil and some other commercial materials.

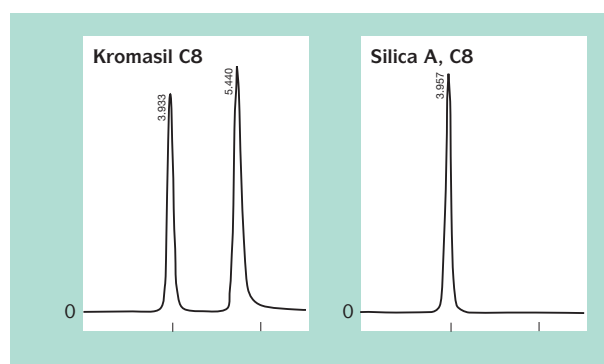


Figure 13 | Chromatogram of a chelating compound 2,2'-bipyridyl ($R_t = 5.44$) and 4,4'-bipyridyl ($R_t = 3.93$) for Kromasil and another commercial material. The test is performed in metal-free system and column (Peek).

Conditions:

Samples and loadings: 2,2'-bipyridyl (2 µg) and 4,4'-bipyridyl (0.5 µg)

Eluent: MeOH/H₂O: 60/40 · Column size: 250 × 4.6 mm · Flow: 1 ml/min.

Wavelength: 254 nm

Why Kromasil offers superior loadability

For preparative and process scale chromatography, loadability is probably the most important property besides selectivity.

Loadability is determined by the following parameters:

- surface area
- pore size
- pore size distribution

and in some cases e.g. chiral purifications,

- ligand density

When these parameters are optimized, high available surface area per unit column volume is obtained.

Specific surface area is a function of pore size and pore volume, as can be seen in figure 14. High pore volume results in high specific surface area, but also generally a weaker silica matrix due to less silica in the structure.

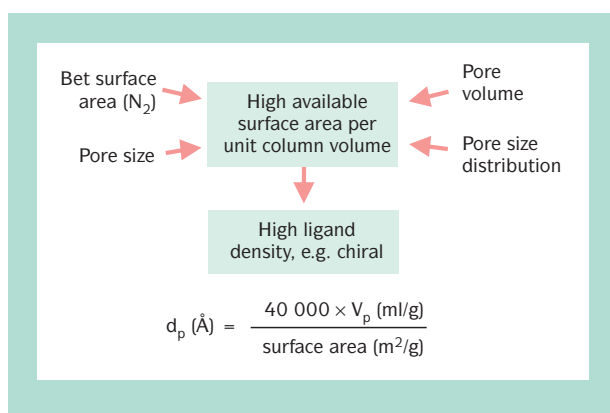


Figure 14 | Important parameters influencing the available surface area of silica materials and the relationship between them if assuming cylindrical pores.

**IN KROMASIL WE HAVE SUCCEEDED
IN COMBINING HIGH LOADABILITY WITH
HIGH MECHANICAL STRENGTH**

What makes Kromasil unique is a combination of high pore volume and surface area, together with a very high mechanical strength.

Pore size and distribution

When maximizing loadability, the size of the molecule to be purified has to be considered because it determines the minimum pore diameter of the silica packing which can be utilized.

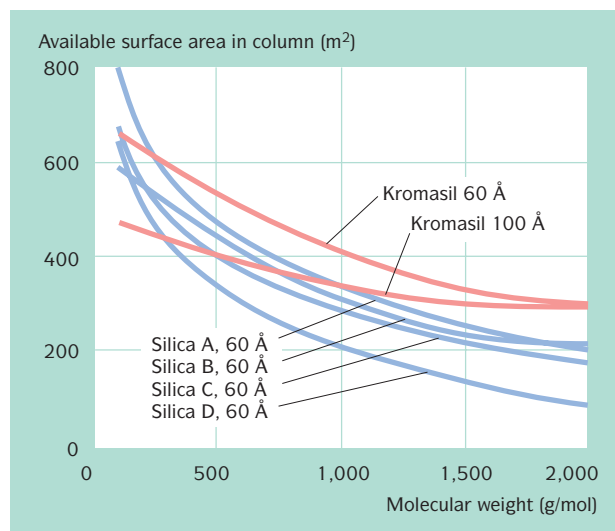


Figure 15 | Available surface area of Kromasil 60 Å and 100 Å compared with other commercial materials of 60 Å pores, measured with polymer standards.

Kromasil packings are available in different pore sizes to optimally fit different applications. The upper limit in molecular weight for different pore sizes is illustrated in figure 15.

The separation of two diastereomers (mw approx. 700 g/mol) on Kromasil 60 Å bare silica and another commercial 30 Å bare silica is shown

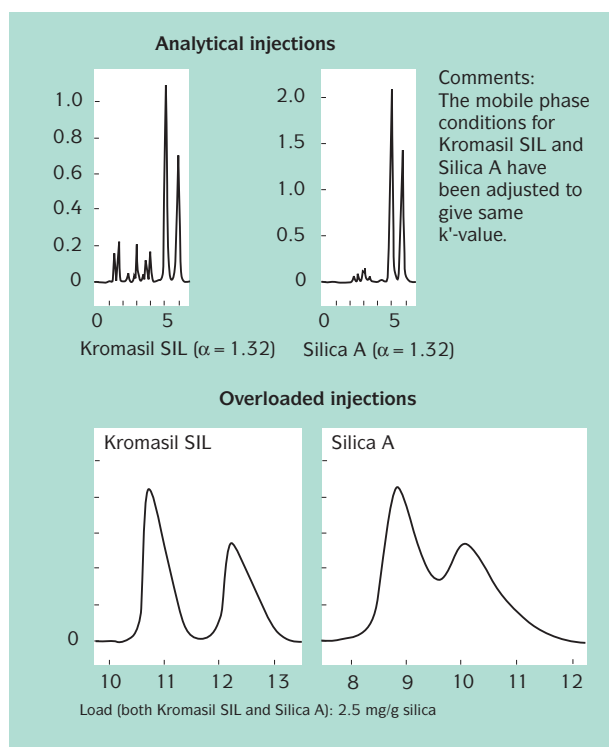


Figure 16 | Analytical and overload chromatograms showing the purification of a diastereomer on Kromasil 60 Å with high available surface area and a comparison with another commercial material, 30 Å, with low available surface area.

to illustrate the importance of available surface area.

To show the impact of ligand density on capacity, a chiral separation using two experimental lots of Kromasil Chiral with different ligand densities is shown in the chromatograms in figure 17.

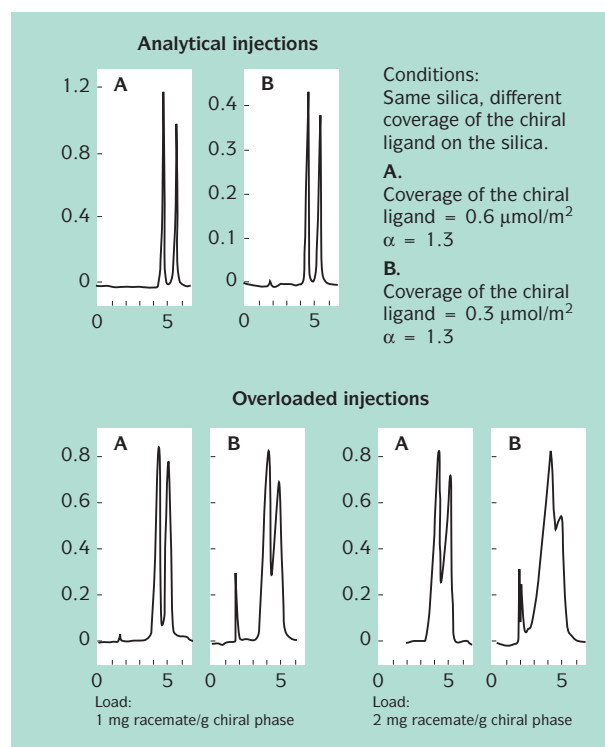


Figure 17 | Separation of a racemate on experimental lots of Kromasil Chiral with different ligand densities.

**THE SMALLER THE PORES,
THE HIGHER THE SURFACE AREA
(AT CONSTANT PORE VOLUME)**

Scalability

Kromasil packings are manufactured in large batches and then fractionated in very narrow particle sizes, all with the same characteristics. This means that you can easily make your scale-up work from analytical scale to process scale. You will obtain the same column efficiency, selectivity and retention time when using Kromasil packed in an analytical column, or a 600 mm I.D. column. Often the efficiency in a large diameter column exceeds that of an analytical column.

Kromasil can be efficiently packed in all commercial industrial HPLC, SFC and SMB systems.

In figure 18, the packing of Kromasil in three commercial preparative HPLC systems is shown.

To exemplify how easy the scalability with Kromasil phases is, three different applications are shown in figures 19, 20 and 21 respectively:

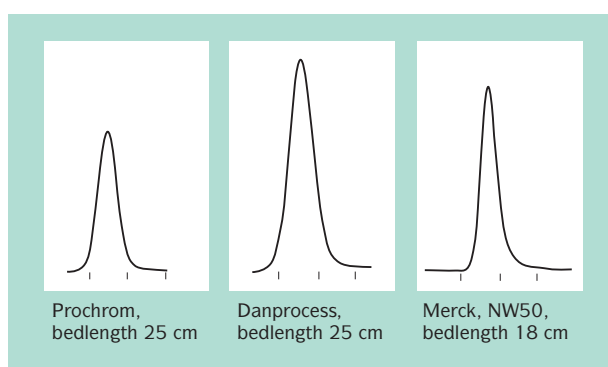


Figure 18 | Efficiency of three different preparative axial compressed columns packed with Kromasil 10 µm C8. Plate numbers > 40,000 p/m can easily be obtained with 10 µm particles.

Conditions: I.D.: 50 mm · Packing material: Kromasil-10 µm-C8 · Packing pressure: 100 bar · Flow rate: 60 ml/min. · Sample: acetophenone Chart speed: 100 mm/min. · Eluent: acetonitrile : water (7 : 3)

insulin, three chiral separations and the purification of fish oils EPA and DHA.

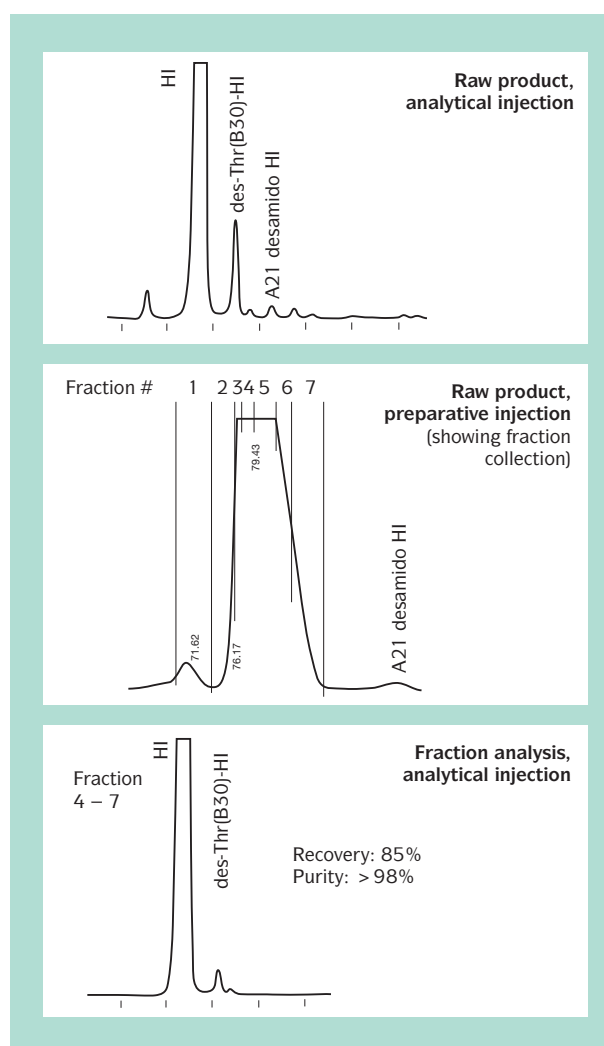


Figure 19 | Large scale purification of insulin.

Conditions, raw product: Purity: 90% · Column: Kromasil-C4-3.5 µm, 4.6 × 120 mm · Detector: 214 nm · Buffer: 0.05 M NaH₂PO₄, 0.1 M NaClO₄/HClO₄, pH = 2.5 · Gradient slope: 30 – 36% acetonitrile / 0 – 55 min. Flow rate: 1.0 ml/min.

Conditions, preparative injection: Loading: 6 g/l column volume Column: 50 × 250 mm, DAC · Packing material: 10 µm-C8-Kromasil Flow rate: 60 ml/min.

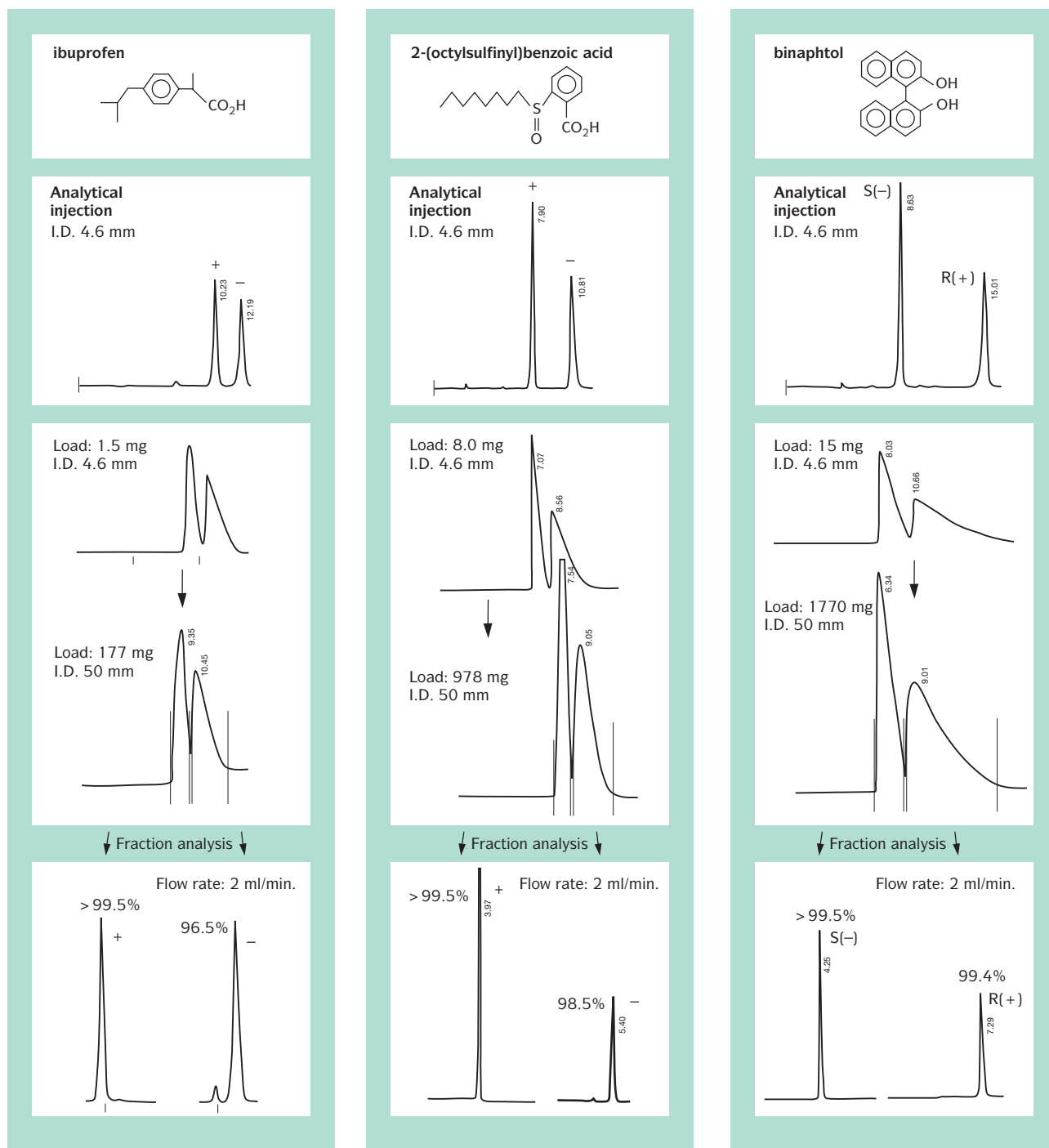


Figure 20 | Large scale purification of three racemates.

Analytical conditions: Column: Kromasil Chiral DMB, 5 μ m, 4.6 \times 250 mm · Flow rate: 1 ml/min. (0.13 cm/s)

Preparative conditions: Column: Kromasil Chiral DMB, 10 μ m, 50 \times 250 mm · Flow rate: 118 ml/min. (0.13 cm/s)

Eluent (analytical and preparative):
 Ibuprofen: Hexane:MTBE 9:1 + 0.1% acetic acid
 2-(octylsulfinyl)benzoic acid: Hexane:THF 8:2 + 0.1% acetic acid
 Binaphthol: Hexane:MTBE 7:3

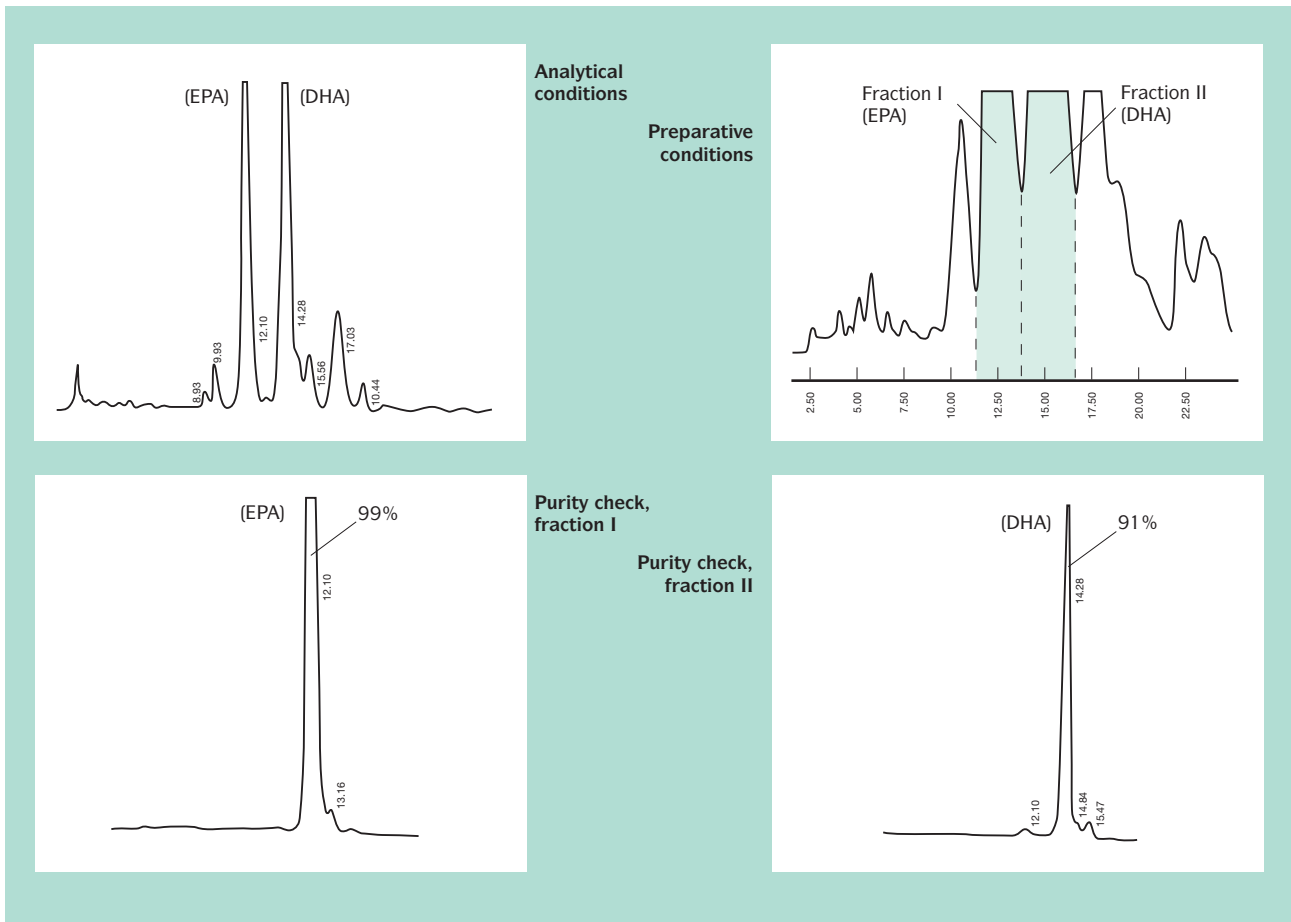


Figure 21 | Large scale purification of fish oils EPA and DHA as ethyl esters.

Analytical conditions:

Column: Kromasil 10 µm, C18; 4.6 × 250 mm

Loading: analytical

Eluent: MeOH: H₂O (95/5): 0 – 16 min. MeOH: 16 – 30 min.

Flow rate: 0.85 ml/min.

Conditions, purity check, fraction I:

Column: Kromasil 10 µm, C18; 4.6 × 250 mm

Loading: analytical

Eluent: MeOH: H₂O (95/5): 0 – 16 min. MeOH: 16 – 30 min.

Flow rate: 0.85 ml/min.

Preparative conditions:

Column: Kromasil 10 µm, C18; 50 × 250 mm

Loading: 2.2 g (7 mg/g)

Eluent: MeOH: H₂O (95/5): 0 – 16 min. MeOH: 16 – 30 min.

Flow rate: 100 ml/min.

Conditions, purity check, fraction II:

Column: Kromasil 10 µm, C18; 4.6 × 250 mm

Loading: analytical

Eluent: MeOH: H₂O (95/5): 0 – 16 min. MeOH: 16 – 30 min.

Flow rate: 0.85 ml/min.

Kromasil publications

Development of analytical and preparative chromatographic separations of novel growth hormone secretagogue compounds.

Joseph H. Kennedy, John L. Bowers, Jeffrey A. Dodge, Charles W. Lugar, Timothy A. Shepherd, V. Scott Sharp. Reprint from Journal of Chromatography A, 872, 2000.

Twelve years of silica-based HPLC purification with focus on peptides – an overview.

Hans Liliedahl, Eka Chemicals. Reprint from plenary presentation at Tides 2000, Las Vegas, USA, 10 May, 2000.

Chromatographic resolution of organic acids using the Kromasil-CHI-TBB chiral stationary phase.

Shalini Andersson, Karin Balmér, Bengt-Arne Persson, AstraZeneca, Mölndal, Sweden. Reprint from Chirality, Vol.11, No. 5/6, 1999.

Non-flammable preparative reversed-phase liquid chromatography of recombinant human insulin-like growth factor-I.

Robert L. Fahrner, Philip M. Lester, Gregory S. Blank, David H. Reifsnnyder. Reprint from Journal of Chromatography A, 830, 1999.

Preparative chiral purification of enantiomers using covalently-bonded chiral stationary phases.

Dauh-Rung Wu, Klaus Lohse, Lin Lin. Reprint from poster presented at 12'th international Symposium on Preparative/Process Chromatography, San Francisco, USA, May 23-26, 1999.

Development and optimization of industrial scale chromatography for use in manufacturing.

A.M. Katti, NaPro BioTherapeutics Inc., Boulder, Colorado, Per Jageland, Eka Chemicals. Reprint from Analisis, Vol. 26, 1998, no 7, M38-M46.

Silica-based packing materials for PREP HPLC, SFC and SMB.

Domingo Sanchez, Eka Chemicals. Reprint from Analisis, Vol. 26, 1998, no 7, M33-M37.

Purification of zopiclone by preparative high performance liquid chromatography.

Ignacio Medina. Reprint from Journal of liquid chromatography & related technologies, Vol. 21 (17), 1998, 2689-2698.

Peak asymmetries of silica-based C18 packing materials under severe conditions – a comparative study.

Lars Jonsson. Reprint from workshop at HPLC '97, Birmingham U.K., June 23-27, 1997.

Considerations about HPLC separation process development routes.

Gregor Mann, Dieter Reinig, Schering AG, Berlin, Germany. Prep '96, Washington DC, USA, May 19-22, 1996.

Chromatographic separation of enantiomers on N,N'-diallyl-L-tartardiamide-based network-polymeric chiral stationary phases.

S. Andersson, S. Allenmark, P. Möller, B. Persson, D. Sanchez. Reprint from Journal of Chromatography A, 741, 1996.

Design of a HPLC separation process.

Gregor Mann and Co-workers, Schering AG, Berlin, Germany. ACS Chromatography Symposium, New Orleans, USA, spring 1996.

A comparison of silica-based C18 and C8 HPLC columns to aid column selection.

Robert J. Steffeck, GD Searle, Skokie, Illinois; Susan L. Woo, Raymond J. Weigand and James M. Anderson, Alltech Associates, Deerfield, Illinois. Reprint from LCGC, Volume 13, Number 9, September 1995.

A new class of network-polymeric chiral stationary phases.

Stig G. Allenmark, Shalini Andersson, Per Möller and Domingo Sanchez. Reprint from Chirality. Vol. 7, No.4, 1995.

Preparative chiral HPLC separation; modeling, optimization and scale-up.

Per T. Jageland, L. Mattias Bryntesson, Per L. Möller. Reprint from poster presented at the Purdue University Chromatographic Workshop '95, West Lafayette, Indiana, USA, October 9-10, 1995.

Chromatographic separation of enantiomers on DATD-based network-polymeric chiral stationary phases.

S. Andersson, P. Möller, B. Persson, D. Sanchez, S. Allenmark. Reprint from poster at Sixth International Symposium on chiral discrimination, St. Louis, USA, April 26-28, 1995.

An investigation on the mechanical stability of various HPLC silica packing materials.

L. Mattias Bryntesson, Per L. Möller, Per T. Jageland. Reprint from poster presented at PrepTech 95, New Jersey, USA, February 13-15, 1995.

Reflections on packing medias.

Gregor Mann, Schering AG, Berlin, Bernd Tesche, Max-Planck-Institut für Kohlenforschung, Mühlheim (Ruhr), Germany. Prep '95 Georgetown University, Washington DC, USA.

The use of a new class of network-polymeric chiral stationary phases for preparative chromatographic separation.

Per Möller, Domingo Sanchez, Börje Persson, Shalini Andersson, Stig Allenmark. Reprint from poster presented at 11th International Symposium on Preparative and Industrial Chromatography, Baden-Baden, October 3-6, 1994.

Economical aspects and optimization in industrial HPLC.

Per T. Jageland, L. Mattias Bryntesson. Reprint from poster at PrepTech 94, Secaucus, New Jersey, USA, March 22-24, 1994.

KromaGuide® – Some new developments in the optimization of HPLC processes by computerized techniques.

Hans Liliedahl and Mattias Bryntesson. 59th Annual Meeting of Society of Chemical Engineers, Sendai City, Japan, March 1994.

Optimization of industrial-scale high-performance liquid chromatography applications using a newly developed software.

Per Jageland, Jeppe Magnusson and Mattias Bryntesson. Reprint from Journal of Chromatography A, 658, 1994.

Effect of surface properties upon the separation of basic compounds on silica based reversed phase material.

Per Möller. Reprint from poster at HPLC 89, 13th International Symposium On Column Liquid Chromatography, Stockholm, June 25-30, 1989.

Preparative high performance liquid chromatography of peptides on a new reversed-phase packing material, Kromasil™ C18.

K. Larsson, W. Herrmann, P. Möller and D. Sanchez. Reprint from Journal of Chromatography, 450, 1988.

Availability of Kromasil

Kromasil 60 Å bulk packings

Phases	Particle sizes, μm					
	3.5	5	7	10	13	16
SIL	■	■	■	■	■	■
CN	■	■	■	■	■	■
Diol	■	■	■	■	■	■

Kromasil 100 Å bulk packings

Phases	Particle sizes, μm					
	3.5	5	7	10	13	16
SIL	■	■	■	■	■	■
C4	■	■	■	■	■	■
C8	■	■	■	■	■	■
C18	■	■	■	■	■	■
NH2	■	■	■	■	■	■
Phenyl	■	■	■	■	■	■
Chiral DMB	■	■	■	■	■	■
Chiral TBB	■	■	■	■	■	■

Kromasil 300 Å bulk packings

Phases	Particle sizes, μm					
	3.5	5	7	10	13	16
SIL	■	■	■	■	■	■
C4	■	■	■	■	■	■
C8	■	■	■	■	■	■
C18	■	■	■	■	■	■

■ = available as standard product

■ = not available as standard product

Kromasil HPLC columns

Kromasil high pressure slurry-packed columns are available in dimensions from 2.1 mm up to 50 mm inner diameter. Packing material available is according to the tables on this page, and column dimensions according to the price list.

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