

## Kromasil<sup>®</sup> EternityXT<sup>™</sup>

Long-life stationary phases for prep HPLC



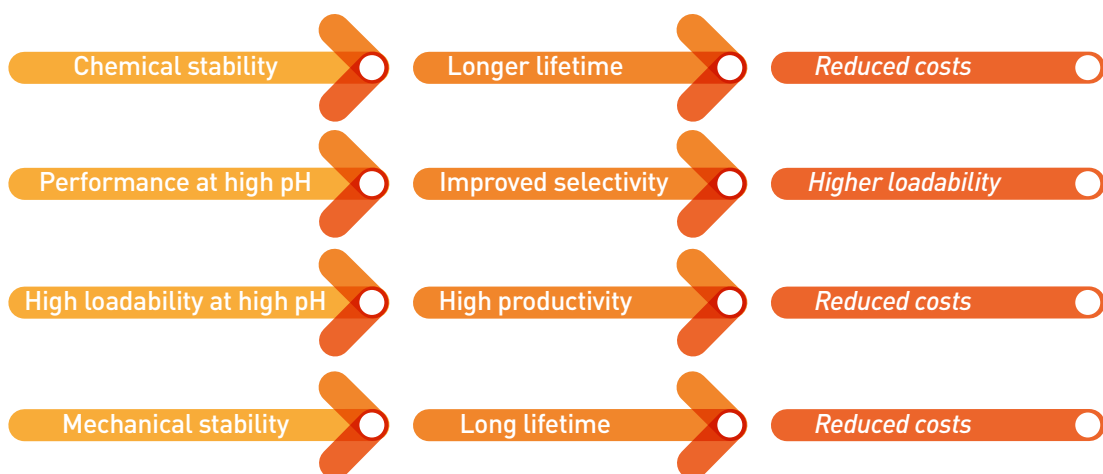
# The new easy way forward

Kromasil® EternityXT is a family of unparalleled stationary phases that keep you in the forefront of purification technology. The Kromasil® EternityXT bulk materials support you in your preparative chromatography needs even under extreme harsh conditions where the mechanical and chemical stability of the packing could be challenged.

## Designed for extended lifetime

The well regarded EternityXT family of products is based on patented technology where the material can operate under extremely demanding conditions, including extended pH range and clean-in-place conditions normally used for

polymer based materials. Kromasil® EternityXT stationary phases can be used beyond the pH window of Kromasil Classic materials, recognized for their mechanical and chemical stability for a variety of applications worldwide.



*As seen in the diagram, the Kromasil® EternityXT features, result in such benefits that improve productivity in the overall purification process, ultimately reducing costs.*



*Kromasil® EternityXT is manufactured in Nouryon's state-of-the-art facilities.*

## The Kromasil® EternityXT family of stationary phases

Kromasil® EternityXT is the chemically stable merged organic/inorganic silica material of choice for the purification of pharmaceuticals, peptides and oligonucleotides under reversed phase preparative chromatography.

This reinforced silica has extraordinary high chemical stability, maintains the benefits of the well-recognized Kromasil® Classic silica and offers first-rate separation power as well as loadability at low, medium and high pH from impurity isolation to full scale purification manufacturing.

Kromasil® EternityXT silica stationary phases are end-capped and are shipped with C18 or C8 derivatizations providing the flexibility needed from small to large scale preparative chromatography.

### Main platform characteristics

Pore size	100 Å
Particle sizes*	1.8, 2.5, 5 and 10 µm
Surface area	310 m <sup>2</sup> /g

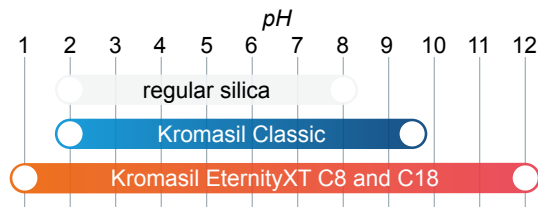
*This platform is fully scalable.*

\* Visit [kromasil.com](http://kromasil.com) for actual availability of particle and phase combinations.

### Kromasil EternityXT 10 µm derivatizations for purification

Type	Carbon content	conditions' pH range
C18	19 %	1 – 12
C8	13 %	1 – 12

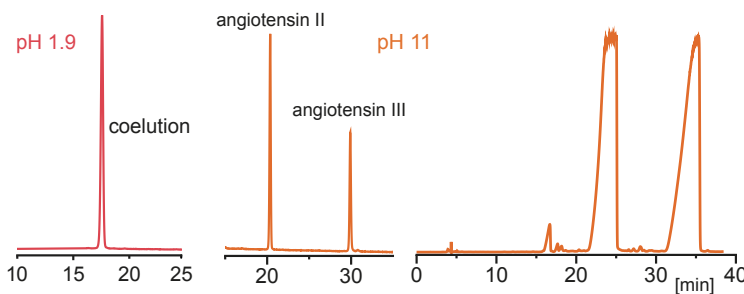
*The operating pH range for both Kromasil® EternityXT C18 and C8 are the same.*



*Chemical stability equal to none.*

With Kromasil® EternityXT C18 and C8 you have stationary phase options to purify main compounds and isolate impurities depending on sample hydrophobicity and you can operate freely through practically the entire pH range. As a significant portion of the API purified today are basic in nature it is possible to run under strong

basic conditions with these phases to increase loading onto the column, improve productivity and therefore reduce overall purification costs. Other compounds such as peptides and oligonucleotides can also benefit from high pH purification methods.



*Increased selectivity for peptides at high pH*  
**Angiotensin II (1046.18 Da):**  
*Asp-Arg-Val-Tyr-Ile-His-Pro-Phe*  
**Angiotensin III (931.09 Da):**  
*Arg-Val-Tyr-Ile-His-Pro-Phe*

#### Conditions

Column: Kromasil EternityXT-10-C18, 4.6 x 250 mm Part number: X10CLA25  
 Flow rate: 1.0 ml/min Temperature: 30 °C

#### Low pH conditions

Mobile phase: acetonitrile / water / 0.1% TFA  
 Gradient: 0 min: 9%, 30 min: 35% acetonitrile  
 Detection: UV @ 220 nm

#### High pH conditions

Mobile phase: acetonitrile / water + 0.1% NH<sub>4</sub>OH  
 Gradient: 0-5 min: 5%, 35 min: 26.5% acetonitrile  
 Detection: UV @ 225 nm

# State-of-the-art stability

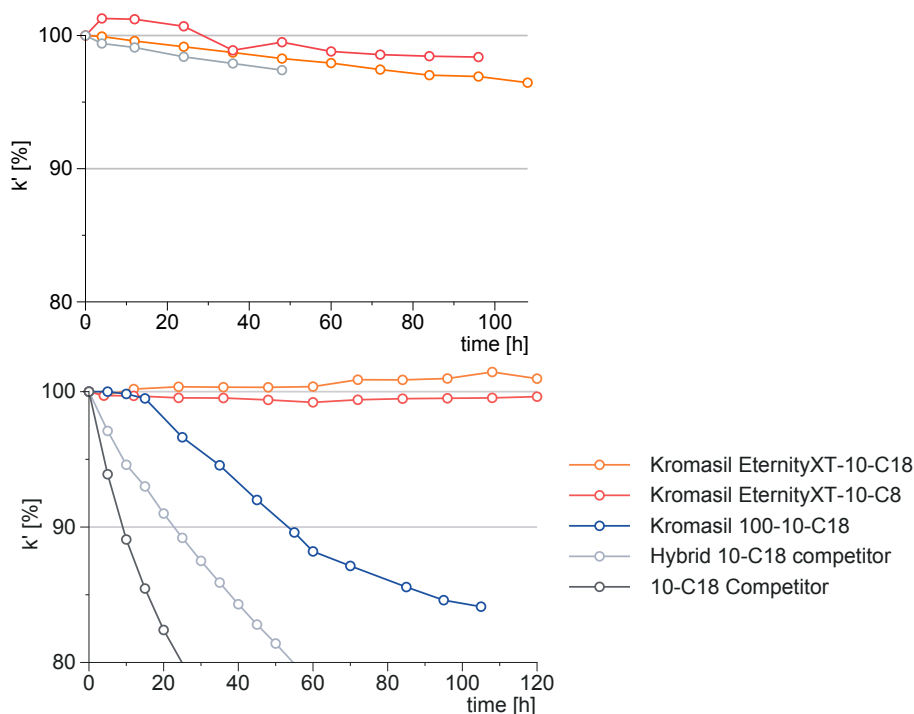
Testing for mechanical and chemical stability is one of the cornerstones in the development of Kromasil® stationary phases. The Kromasil® EternityXT materials for preparative chromatography have been designed to specific requirements where the packed material has been exposed to various hydrolysis and clean-in-place conditions.

## Long term chemical stability

In the following figures the long-term chemical stability at low and high pH is shown.

Low pH conditions simulate very long-term use by applying an elevated temperature of 80 °C, and a highly aqueous mobile phase, 95% water, with 0.1% TFA (trifluoroacetic acid), pH ≈ 1.9. The EternityXT materials still show excellent stability, with very low shift in  $k'$  over time

High pH conditions include highly aqueous bicarbonate buffer at pH 10.5, at an elevated temperature of 60 °C. It has been shown that bicarbonate buffer is especially aggressive when used with silica-based packing materials, but it has little effect on the retention factor for EternityXT, due to the very dense derivatization



### Conditions

Column size: 4.6 x 250 mm

### Acidic hydrolysis

Mobile phase: methanol / water / TFA (5/95/0.1)

Flow rate: 0.2 ml/min

Temperature: 80 °C

### Basic hydrolysis

Mobile phase: acetonitrile / 10 mM ammonium bicarbonate, pH 10.5 (10/90)

Flow rate: 0.2 ml/min

Temperature: 60 °C

### Chromatographic test conditions

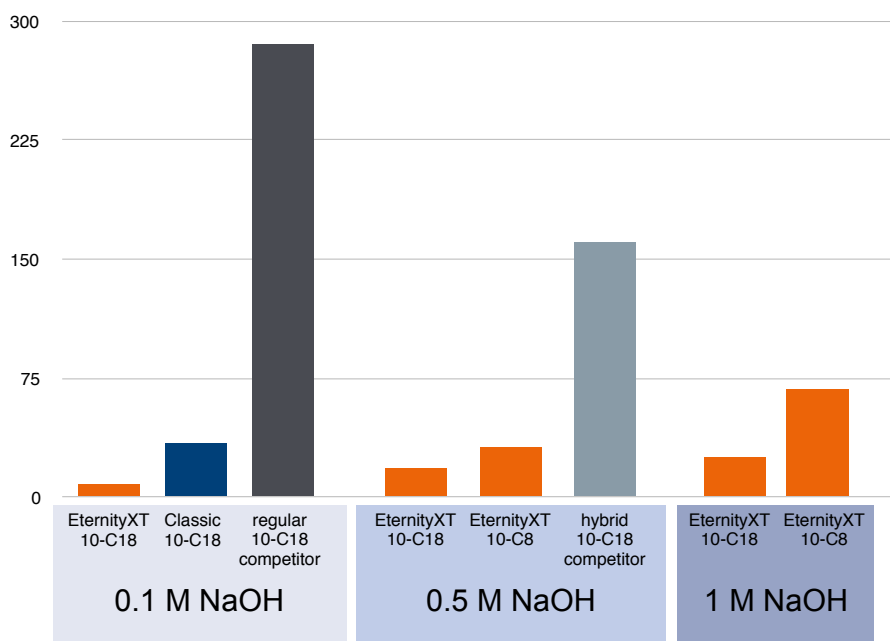
Test compound: phenanthrene

Flow rate: 1 ml/min

## Chemical stability - CIP conditions

It is possible for you to sanitize or regenerate Kromasil® EternityXT C18 and C8 in-column (cleaning in place, CIP) even at 1 M NaOH, if you so require. Kromasil® EternityXT stationary phases are disruptive in the marketplace as 1 M

NaOH is a standard in biochromatography for treatment of polymer resins and now this barrier has been minimized between polymer and silica based materials due to the characteristics of the Kromasil® EternityXT platform.



The figure shows the leakage of silicon during after a number of CIP cycles at different NaOH concentrations. At 0.1 M NaOH, even Kromasil® Classic resists better than regular competitors. Already at 0.5 M NaOH, the main hybrid 10-C18 competitor shows serious leakage, actually higher than EternityXT phases at 1 M NaOH.

### Conditions

Column size: 4.6 x 250 mm

Mobile phase: 10 column volumes of NaOH solution/ethanol (50/50)

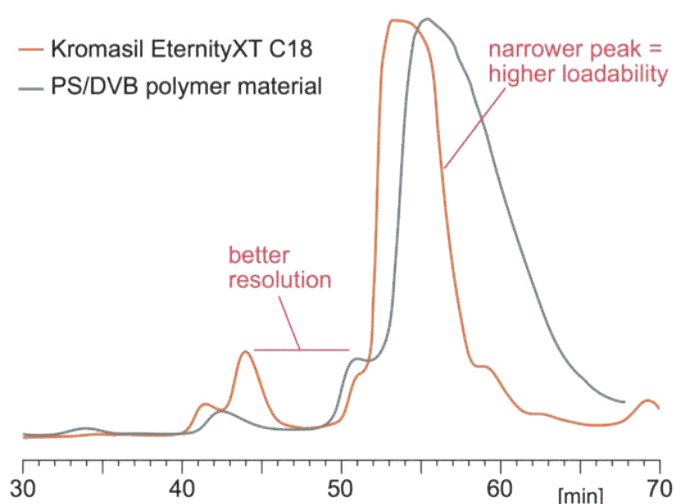
Test compound: nortriptyline at pH 7.0



## Chromatographic performance - Kromasil® EternityXT vs polymeric packing

It is well-known that polystyrene/divinylbenzene (PS/DVB)-based packing materials exhibit very high chemical stability at high pH, allowing cleaning steps involving for example 1 M NaOH. However, the material can unfortunately not compete with silica-based packing materials in terms of chromatographic performance.

With Kromasil® EternityXT it is now possible to obtain the high separation power associated with silica-based materials, and at the same time experience very high chemical stability at high pH.



The graph shows a typical comparison between a silica- and a polymer-based packing material: EternityXT and the market leader for PS/DVB-based packings, where identical conditions have been used. The chromatogram shows a preparative separation of insulin, where it can be seen that the silica-based material, EternityXT, has markedly sharper peaks, with roughly only 50% of the band broadening seen on the PS/DVB-based material. Both analytical efficiency and loading capacity is significantly better for EternityXT.

### Conditions

Column size: 4.6 x 250 mm

Mobile phase: ethanol / ammonium acetate 0.2 M

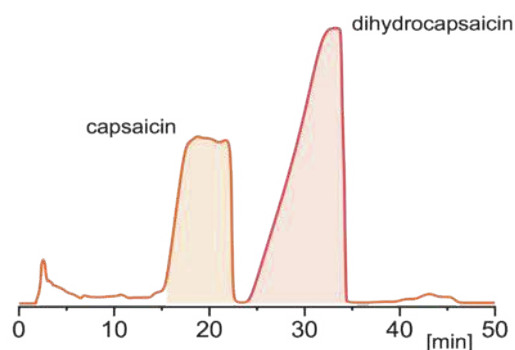
Gradient: for EternityXT, 0 min: 30%, 60 min: 38% ethanol  
for PS/DVB, 0 min: 34%, 60 min: 42% ethanol

Particle size: 10 µm

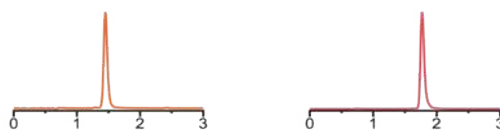
Flow rate: 0.7 ml/min

Temperature: 25 °C

## Preparative separation with Kromasil® EternityXT C8



### Analysis of pooled fractions



### Pool fraction analysis

	Purity [%]	Yield [%]
capsaicin	99.3	99.0
dihydrocapsaicin	99.4	98.0

### Preparative conditions

Stationary phase: Kromasil EternityXT-10-C8

Mobile phase: acetonitrile / water [45/55]

### Analytical conditions

Column: Kromasil EternityXT-2.5-C18, 2.1 x 100 mm

Mobile phase: acetonitrile / water [70/30]

## Availability

Kromasil® EternityXT for preparative applications is based on 10 µm particles with 100 Å pore size and with C18 and C8 derivatizations.

### Bulk materials

	derivatization	
	C8	C18
EternityXT, 10 µm	X10CMblk	X10CLblk

### Columns

Column size	stationary phase	
	EternityXT-10-C8	EternityXT-10-C18
4.6 × 250 mm	X10CMA25	X10CLA25
10 × 100 mm	X10CMP10	X10CLP10
10 × 150 mm	X10CMP15	X10CLP15
10 × 250 mm	X10CMP25	X10CLP25
21.2 × 100 mm	X10CMQ10	X10CLQ10
21.2 × 150 mm	X10CMQ15	X10CLQ15
21.2 × 250 mm	X10CMQ25	X10CLQ25
30 × 100 mm	X10CMR10	X10CLR10
30 × 150 mm	X10CMR15	X10CLR15
30 × 250 mm	X10CMR25	X10CLR25

For other particle sizes, visit [www.kromasil.com](http://www.kromasil.com).

Other column sizes available upon request.



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The moment you adopt our Kromasil® high performance concept, you join thousands of chromatographers who share a common goal: to achieve better separations when analyzing or isolating pharmaceuticals or other substances.

Not only will you benefit from our patented silica technology, but you gain a strong partner with a reliable track record in the field of silica products. For the past 70 years, we have pioneered new types of silica. Our long experience in the field of silica chemistry is the secret behind the development of Kromasil® stationary phases, and the success of our chromatography team.

Kromasil® media are available in bulk and in high-pressure slurry-packed columns. The production of Kromasil® silica is ISO 9001 and ISO 14001 certified.

Kromasil® is a brand of Nouryon, a global specialty chemicals leader. Markets and consumers worldwide rely on our essential solutions to manufacture everyday products. The dedication of more than 8200 employees with a shared commitment to our customers, safety, sustainability and innovation has resulted in a consistently strong performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands.

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