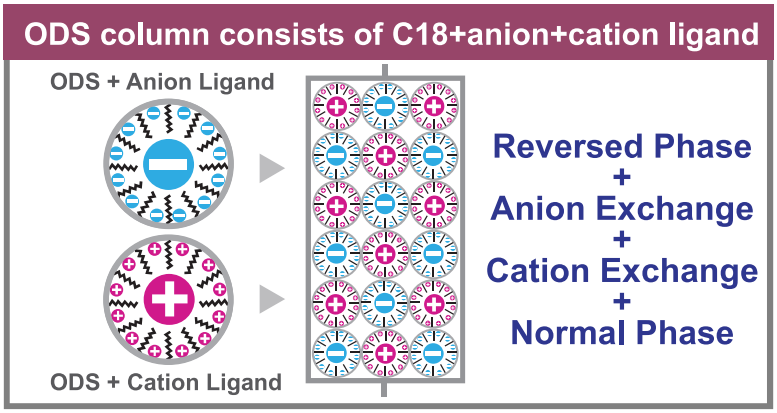
Imtakt USA Scherzo C18 Family

Reversed Phase + Anion Exchange + Cation Exchange HPLC Columns

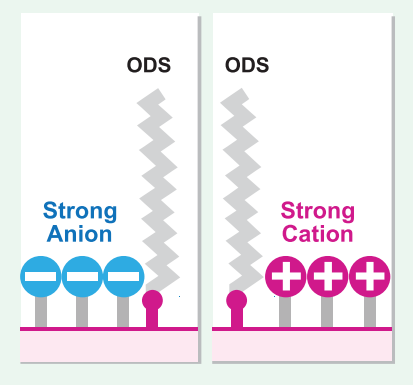
Simultaneous analysis of both cationic and anionic compounds
ODS + Ion Exchange separation mode
Three kinds of packings with different ion exchange capacities
For polar compounds
Different selectivity from conventional ODS columns
LC-MS compatible without using ion-pairing reagents
ODS column consists of C18+anion+cation ligands
Purified Porous Silica •3um Particle •13nm Pore



Scherzo family columns can operate without adding an ion-pairing reagent which is required for conventional ODS columns. In addition, both anioic and cationic compounds are retained on this column. The hydrophobicity of the Scherzo family is similar to that of a conventional ODS column, so analysis of a compound in combination with a Unison UK-C18 column (conventional ODS phase) will be very effective for method development.

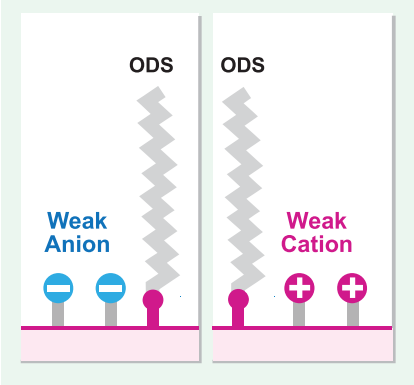
Three kinds of ODS with different ion exchange capacities

Scherzo SS-C18



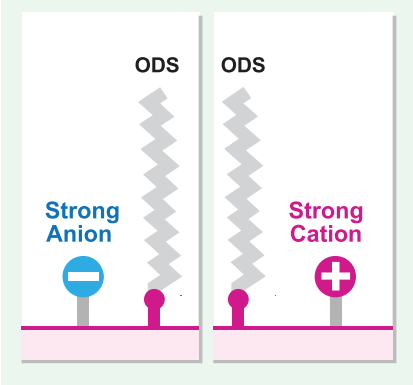
Large amount of strong ionic ligands loaded onto this ODS column. Effective for improved retention of zwitterions or weak ionic compounds

Scherzo SM-C18



Weak ionic ligands adequately loaded onto this ODS column. Designed for separation of basic/acidic compounds at neutral pH condition

Scherzo SW-C18



Low amount of strong ionic ligands loaded onto this ODS column. Effective for strong ionic compound elution or basic compounds with formic acid eluent

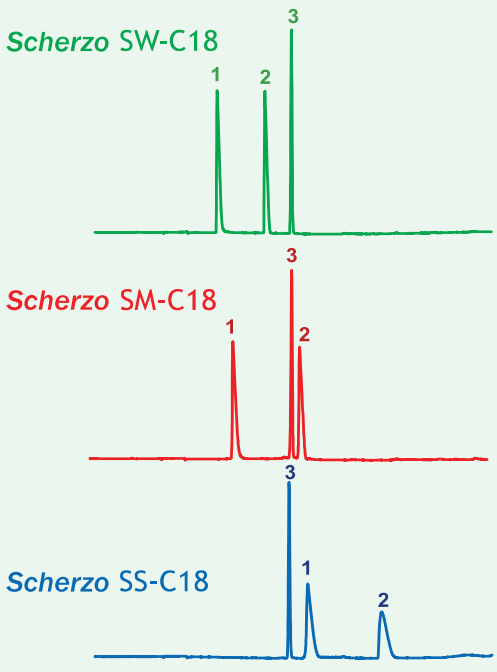
Separation modes of Scherzo C18 columns

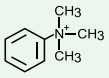
The Scherzo C18 Family, (SS-C18, SM-C18, SW-C18), consists of not only ODS ligands, but also anion ligands and cation ligands. It also provides reversed-phase mode, both ion exchange modes, and normal phase mode.

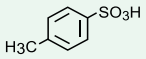
Separation Mode	Stationary Phase	Properties
Reversed-Phase	Octadecyl	Increasing organic solvent composition (decreasing polarity of eluent) decreases retention.
Anion Exchange	Cation	Increasing ionic strength (salt or acid concentration) decreases retention for acidic compounds. Generally, low pH increases retention.
Cation Exchange	Anion	Increasing salt concentration decreases retention for basic compounds. SM-C18 retains more with increasing pH, while SS-C18 and SW-C18 retain more at lower pH.
Normal Phase	Anion/Cation	Polar solutes which cannot be retained with 100% aqueous eluent may be retained by using > 50% organic solvent composition due to electrostatic interaction.

Retention properties of Scherzo C18 columns (RP+AX+CX)

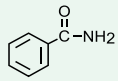
Multi-mode ODS Scherzo C18 columns consist of ODS ligands which have reversed-phase mode, plus anion and cation ligands which have anion/cation exchange modes. Three kinds of Scherzo columns have individual ion exchange capacities to find the best column for target compounds which have different ionic properties. Moreover, hydrophobicity between Scherzo C18 and Unison UK-C18, a conventional ODS, is similar, so these columns can be used as comparisons during method development.



1 
phenyltrimethylammnonium (Cation)

2 
p-toluenesulfonic acid (Anion)

The entire family, all retain both basic compounds (1) and acidic compounds (2). SS-C18 shows largest retention, followed by SM-C18 and then SW-C18. Retention may be affected by compound dissociation and mobile phase pH to provide switched retention.

3 
benzamide (Neutral)

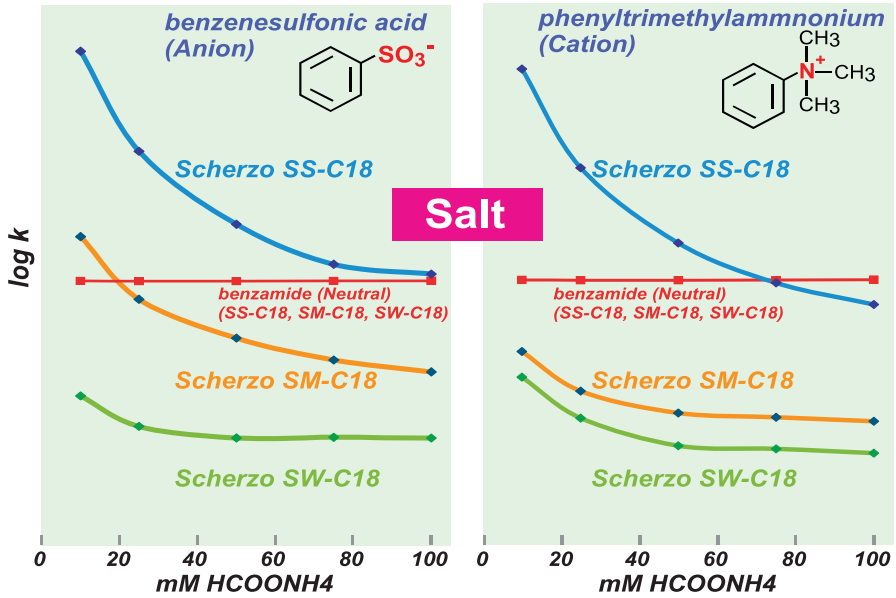
Non-ionic compounds may be eluted with similar retention between these columns.

Scherzo SS-C18, SM-C18, SW-C18, 150 x 3 mm
A: 40 mM ammonium formate
B: 100 mM ammonium formate / acetonitrile = 50 / 50
0 - 100 %B (0 - 15 min), 0.4 mL/min, 37 °C, 260 nm

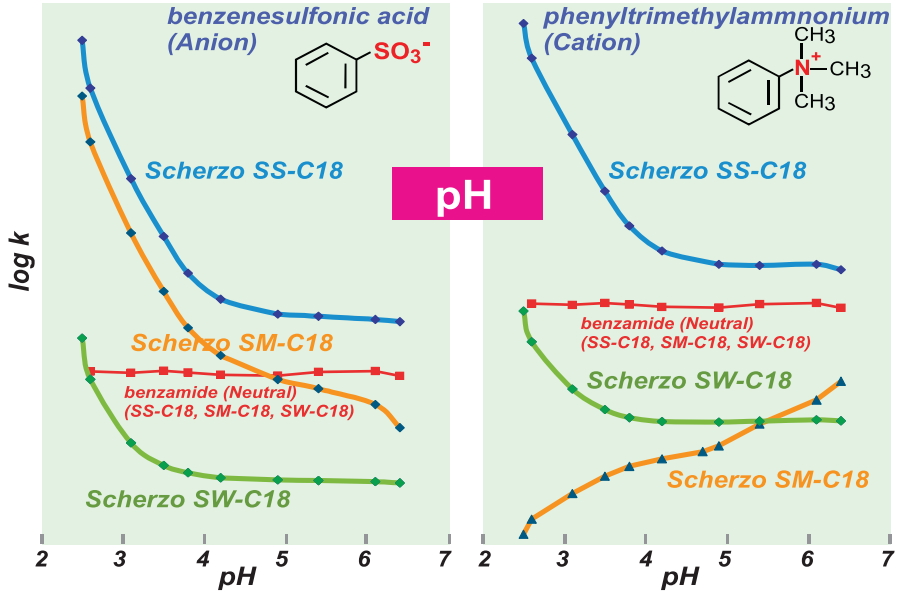
At neutral pH conditons, SW-C18 has the least retention capacity, and SM-C18 and SS-C18 have stronger retention power. These retention differences among the columns will be enhanced under lower initial salt concentration.

Factors affecting retention on Scherzo C18 Columns

- You can find the best HPLC conditions by optimizing ionic strength or pH to improve retention / separation for ionic compounds, which is difficult on a conventional ODS column
- Not only pH but also ionic strength (concentration of salt or acid) will strongly affect the retention on Scherzo C18 columns
- This effect is the same as ion-exchange columns
- Scherzo C18 columns, which have RP + both ion exchange modes, require optimization of organic solvent, pH, and ionic strength



For the Scherzo multi-mode ODS columns, optimizing the salt concentration is as important as optimizing the organic solvent. In the left figure, retention of both anionic and cationic compounds is decreased when salt concentration is increased. At the same salt concentration, SS-C18, which consists of a large amount of strong ionic ligands, retains strongly. SM-C18 , with weak ionic ligands has medium retention. And finally, SW-C18, which has a low amount of strong ionic ligands, shows the lowest retention.



pH is also an important factor for the elution of ionic compounds. Retention will change dramatically between neutral pH (ammonium acetate or formate) and low pH (formic acid) conditions. SS-C18 and SW-C18 consist of strong ionic ligands and retention will be increased under low pH conditions. On the other hand, SM-C18 consists of weak ion ligands which cannot ionize at a low pH - therefore, retention of basic compounds will be decreased due to a decrease in ionization capacity at low pH.

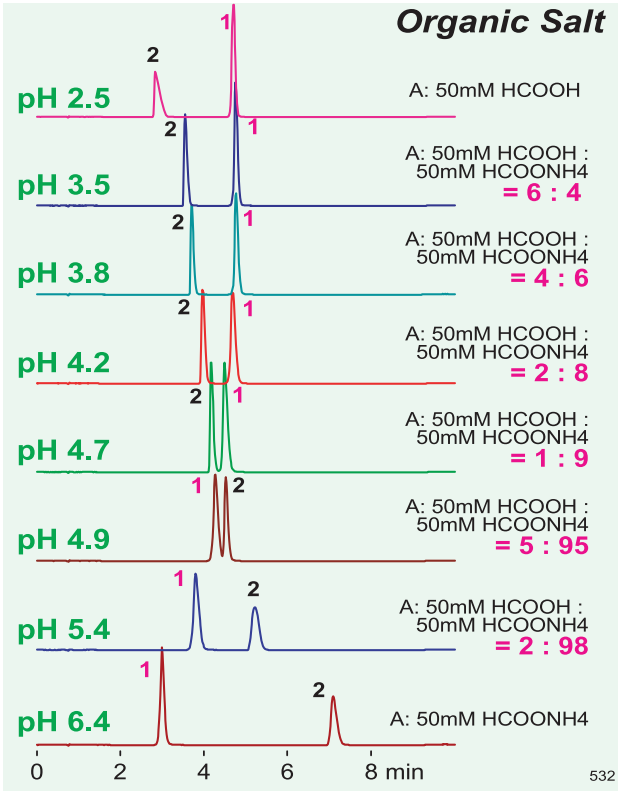
Elution strategies by Scherzo C18 columns

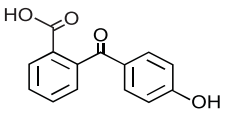
Non-ionic hydrophobic solutes	Organic solvent composition should be optimized (similar to conventional ODS). Peak shape is often improved by using 0.1% acetic acid.
Ionic hydrophobic solutes	A combination of organic solvent and 20-100mM of salt or acid at optimal pH should be used for separation of both acidic / basic compounds .
Weak ionic-polar solutes	SS-C18 is often the best choice for weak ionic polar solutes. Ionic strength should be increased for compounds that contain multiple ionic functional groups. Neutral pH conditions are required for mono-carboxylic acid compounds .
Strong ionic-polar solutes	SW-C18 may be useful when it is difficult to elute on SS-C18 or SM-C18. Strong ionic compounds have strong ionic interaction, so it is recommended to use multiple gradient elutions with ionic strength and organic solvent composition.

Scherzo SM-C18 column applications (Salts, Vitamins)

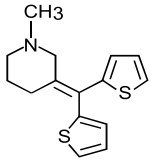
Scherzo SM-C18, consisting of ODS ligands and both weak anion / cation ligands, is useful for a wide range of ionic compounds such as salts, vitamins, acidic / basic compounds, alkaloids etc.
It is also offers different selectivity from conventional ODS like Unison UK-C18.

Simaltanious analysis of salt



1 

hibenzic acid
Acidic

2 

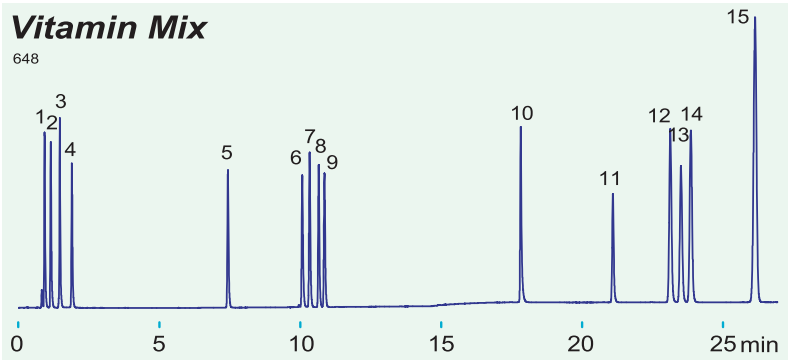
tipepidine
Basic

Scherzo SM-C18, 50 x 3 mm
A: formate buffer, B: acetonitrile
20-60 %B (0-8min), 0.4 mL/min, 37 °C, 280 nm

Tipepidine hibenzate, a popular cough medicine, consists of basic and acidic components.
Conventional ODS columns can usually analyze organic salts, but sometimes there is a problem in separating other compounds. By changing eluent pH, one can change elution order (selectivity) on SM-C18. When pH is increased, retention of basic compounds will be increased, while acidic compounds will be decreased. SM-C18 was designed to show effective ionic interaction under neutral pH conditions .
SM-C18 will provide a better solution than conventional ODS columns when solute sensitivity and separation is required. SM-C18 is available for not only organic salts but also inorganic salts separation like NaCl.

Water-fat soluble vitamins

Scherzo SM-C18, 150 x 2 mm
A: 0.3% HCOOH aq.
B: acetonitrile
0%B (0-0.1 min)
0-30%B (0.1-10 min)
30%B (10-11 min)
30-100%B (11- 12 min)
100%B (12-26 min)
0.3 mL/min, 30°C, 2uL(DMSO soln.)
ELSD (SEDEX 90LT, 40°C, 3.5Bar)



	RT	%RSD (n=6)		LOD (S/N=3)
	Minutes	RT	Response	ng (o.c.)
1-B1: Thiamine	0.92	0.11	2.6	5.7
2-B8: myo-Inositol	1.14	0.09	6.2	6.3
3-B6: Pyridoxine	1.44	0.16	2.7	1.8
4-C: Ascorbic acid	1.94	0.25	2.4	9.6
5-B5: Pantothenic acid	7.32	0.15	6.8	6.9
6-B9: Folic acid	9.92	0.09	3.1	8.0
7-B12: Cyanocobalamin	10.17	0.11	4.1	4.6
8-B2: Riboflavin	10.49	0.11	3.4	5.0
9-B7: Biotin	10.70	0.09	4.2	4.8
10-A: Retinol	17.64	0.06	6.7	1.7
11-K2: Menaquinone	20.87	0.07	2.1	14.2
12-D2: Ergocalciferol	22.89	0.06	1.5	47.6
13-D3: Cholecalciferol	23.26	0.06	2.6	52.6
14-E: a-Tocopherol	23.61	0.07	1.6	45.0
15-K1: Phylloquinone	25.86	0.07	1.7	41.7

Since water-soluble vitamins are hydrophilic and fat-soluble vitamins are hydrophobic, simultaneous analysis of both types of vitamins is a very difficult issue.
SM-C18 succeeds in this application; gradient elution from acidic pH aqueous conditions to acetonitrile provides sufficient separation of various 15 vitamins. D2 and D3 is also separated. Thiamine (basic compound) and ascorbic acid are both retained as a multi-mode ODS column advantage.
Detection is done by ELSD in this application, but there is an opportunity for MS detection with the use of a volatile mobile phase.

Data provided by Dr. Eric VERETTE, SEDERE S.A.S., France

Mobile phase preparation for Scherzo C18 columns

Scherzo C18 columns consist of ODS and ionic ligands. At first this new approach is difficult for some users to conceptualize. However, it is easier to think of the columns as an ODS column AND an ion exchange column. The following eluent conditions are a rough guideline:

Isocratic Elution

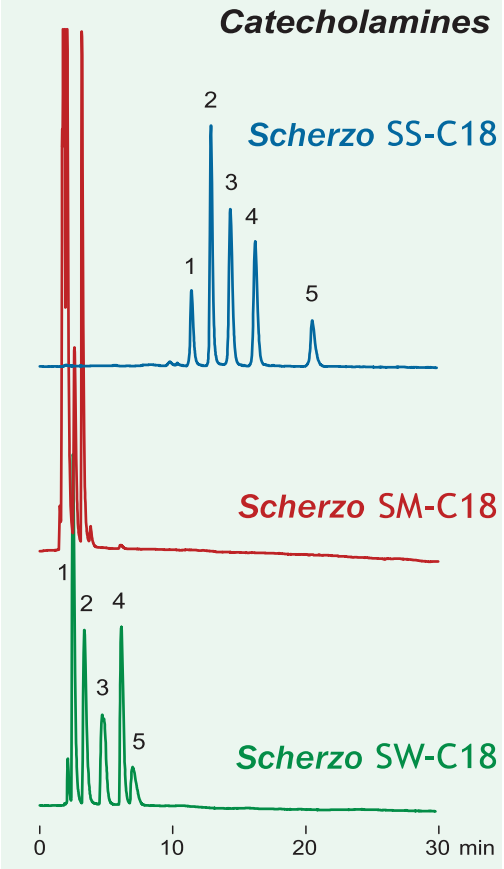
water / acetonitrile / HCOOH = x / y / 0.1 (x+y = 100)	**Acidic pH Eluent**
50mM ammonium acetate / acetonitrile = x / y (x+y = 100)	**Neutral pH Eluent**

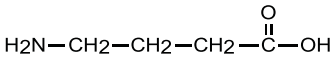
Gradient Elution

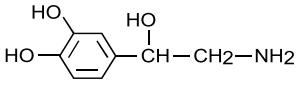
A) water / HCOOH = 100 / 0.1 ***B) water / acetonitrile / HCOOH = 30 / 70 / 0.5***	**Gradient with Acid and Organic Solvent**
A) 10mM ammonium acetate ***B) 100mM ammonium acetate / acetonitrile = 30 / 70***	**Gradient with Salt and Organic Solvent**
A) water / HCOOH = 100 / 0.1 ***B) 100mM ammonium formate / acetonitrile = 30 / 70***	**Gradient with pH, Ionic Strength, and Organic Solvent**

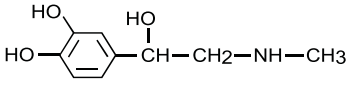
Comparison of Scherzo columns: Optimized on SS-C18 (Neurotransmitter)

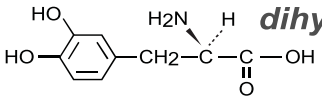
Each Scherzo column has different properties and target compounds depending on column choice. SS-C18 has strong ionic ligands and is useful for zwitter-ions, as well as for separating weak ionic compounds.

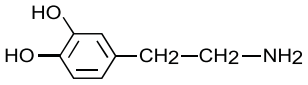


1 
gamma-aminobutyric acid (GABA)

2 
noradrenaline (norepinephrine)

3 
adrenaline (epinephrine)

4 
dihydroxy-L-phenylalanine (L-DOPA)

5 
dopamine

150 x 3 mm
A: water / formic acid = 100 / 0.3
B: 100mM ammonium formate / acetonitrile = 70 / 30
0-60%B (0-30 min)
0.4 mL/min (9MPa), 37 °C, ELSD

Due to strong ionic ligands, SS-C18 and SW-C18 retain more than SM-C18 which has weak ionic ligands. In particular, SS-C18 will provide an excellent retention performance for very polar ionic compounds. Also, SW-C18, which interacts weakly with these compounds, may be useful for high-throughput analysis.
Formic acid is strictly required at initial conditions due to positive ion of GABA, but dopamine has a stronger interaction under such acidic conditions. This application is done with a multiple gradient mode using pH, ionic strength, and organic solvent gradients.

Scherzo SS-C18 column applications (Zwitter-ions)

Zwitter-ions which have internal salt generating iso-electric points (pI) are very polar. While it is difficult to retain zwitter-ions on a conventional ODS column, Scherzo SS-C18 provides very effective retention ability.

Figure 5a ***Zwitter-ions***

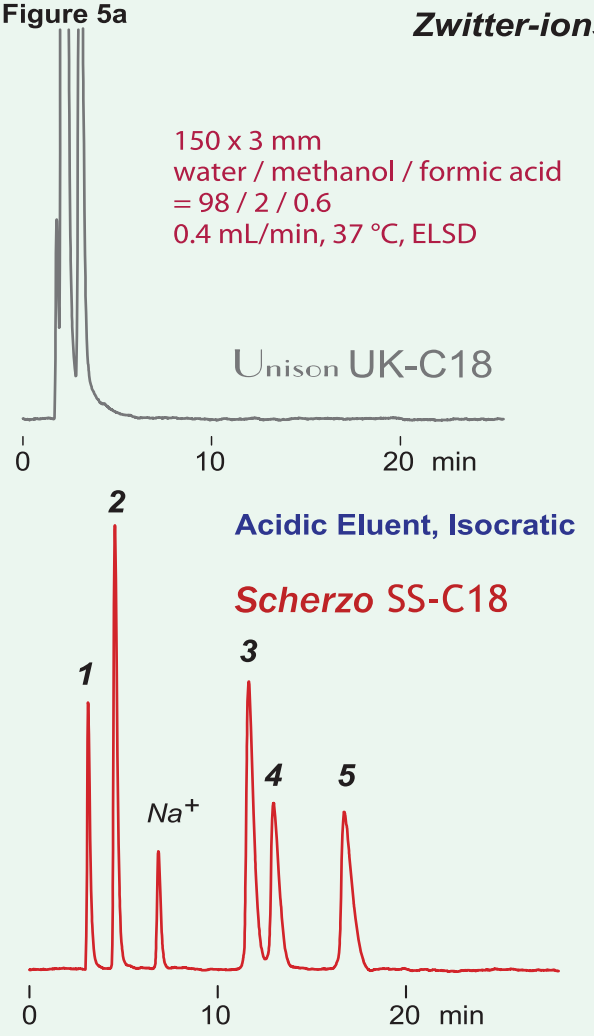
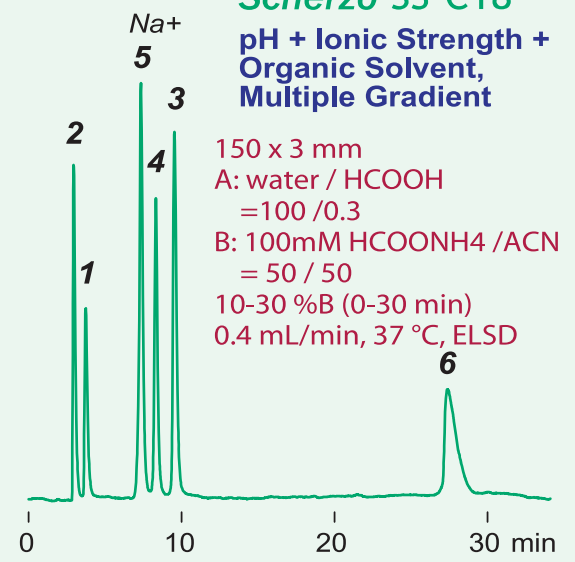
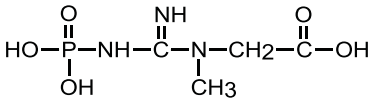
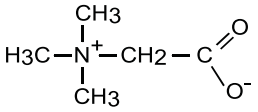


Figure 5b

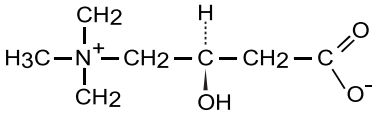


1 

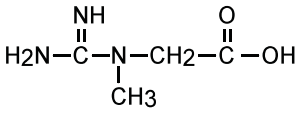
creatine phosphate

2 

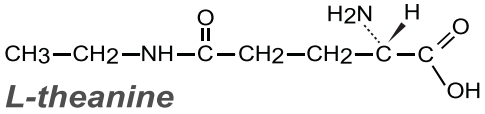
betaine

3 

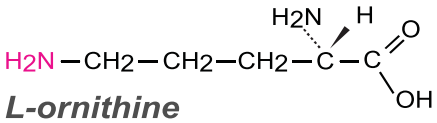
L-carnitine

4 

creatine

5 

L-theanine

6 

L-ornithine

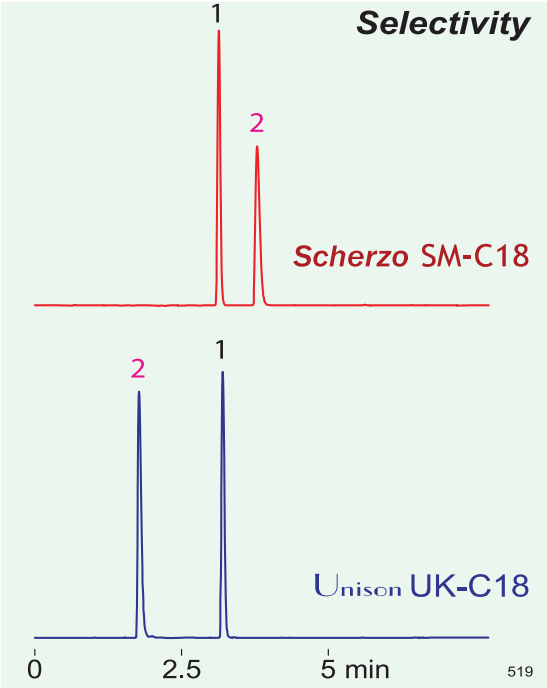
Zwitter-ions, as typified by amino acids are very polar and difficult to retain on conventional ODS columns. SS-C18 which consists of many strong ionic ligands can retain and separate those zwitter-ions easily .

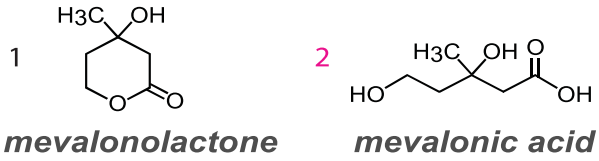
Figure 5a shows that SS-C18 enables sufficient retention/separation due to ionic interaction between positive-charged zwitter-ions under acidic conditions. There are opportunities to get optimized retention when formic acid or organic solvent concentration is changed.

Figure 5b shows an example with multiple gradient elution with pH, ionic strength, and organic solvent. Zwitter ions are ionized to positive under acidic condition, so initial eluent should have low pH conditions. In contrast, ornithine has another amino group which provides a positive charge and becomes a strong cationic compound, so it is difficult to elute under acidic conditions. In this case, neutral pH provides weak ionic interaction and pH gradient with increasing ionic strength and organic solvent is very effective for elution of ornithine.

Scherzo SM-C18 column applications (Separation Selectivity)

Scherzo C18 columns are designed by using the same silica and ODS ligand density as a Unison UK-C18 column. SM-C18 may be effective in changing selectivity when it is difficult to separate impurities on an ODS column.



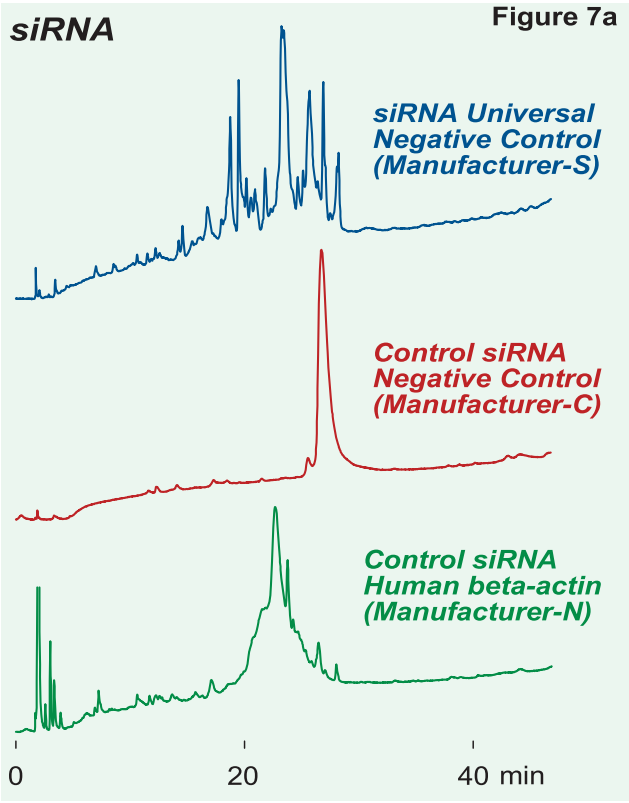


mevalonolactone *mevalonic acid*

150 x 3 mm
5mM ammonium formate /acetonitrile = 90 /10
0.4 mL/min (10MPa), 37 °C, ELSD

Scherzo SM-C18 and Unison UK-C18 are designed in such a way that they provide similar retention of non-ionic compounds. In addition, SM-C18 can retain both anionic / cationic compounds under neutral pH conditions. This means that there is an opportunity to improve separation on SM-C18 than on a conventional ODS by only changing columns under the same conditions.
This comparison between SM-C18 and UK-C18 helps to determine whether or not an unknown compound is ionic.

Scherzo SW-C18 column applications (Acidic Compounds)



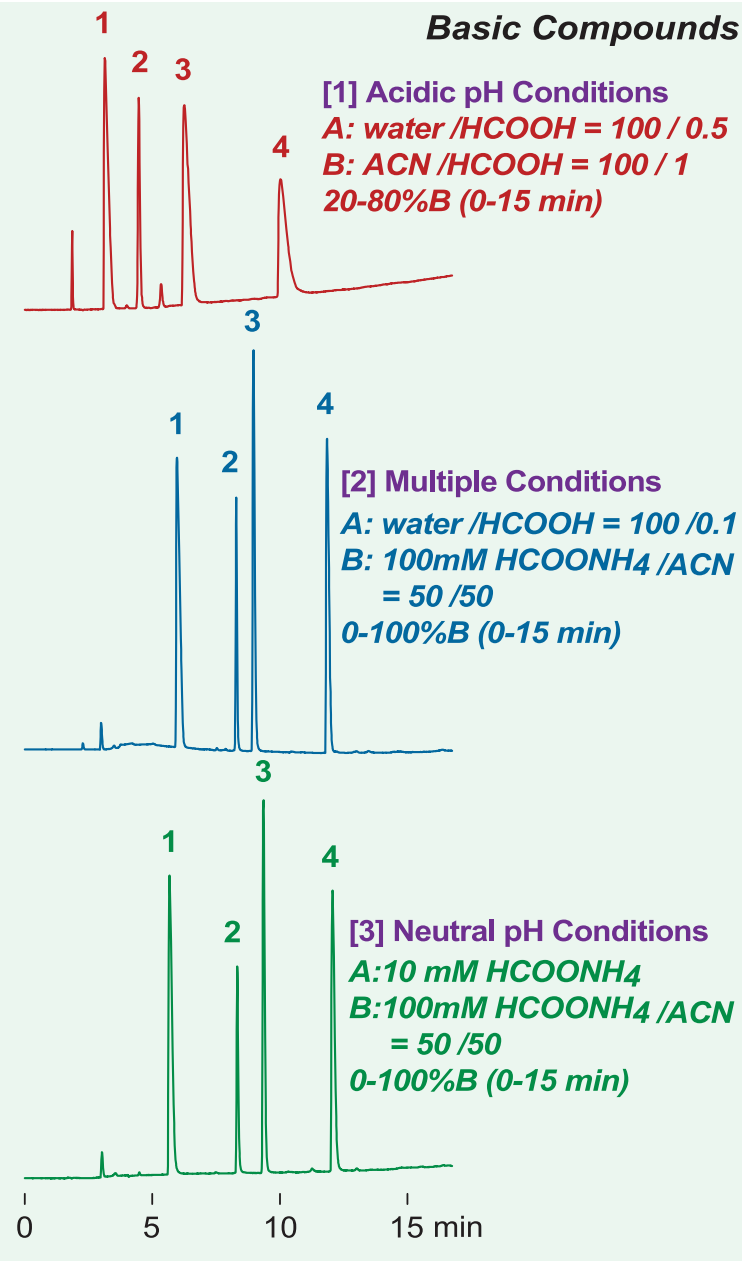
Scherzo SW-C18 has a small amount of strong ionic ligands which is a novel structural idea from traditional ion-exchange columns. This surface structure provides better elution of strong ionic compounds.
siRNA (small interfering RNA), around 21mer base paired double stranded RNA, is getting lots of attention for next generation medicine. But it is very polar and has a lot of phosphoric acids inside, and is therefore difficult to analyze in RP mode. Figure 7a on SW-C18 shows multiple peaks of commercial siRNA reagents which may include different structural compounds. SW-C18 seems to recognize the different number of nucleic bases (hydrophobic interaction) and phosphoric acids (ionic interaction). SW-C18 may be useful for structure study of siRNA.
SW-C18 can separate not only siRNA, but also ATP or oligo-nucleotides without adding an ion-pairing reagent in the eluent. SW-C18 is applicable for strong ionic compounds like phosphoric compounds because there is a small amount of ionic ligands on the surface of the stationary phase.

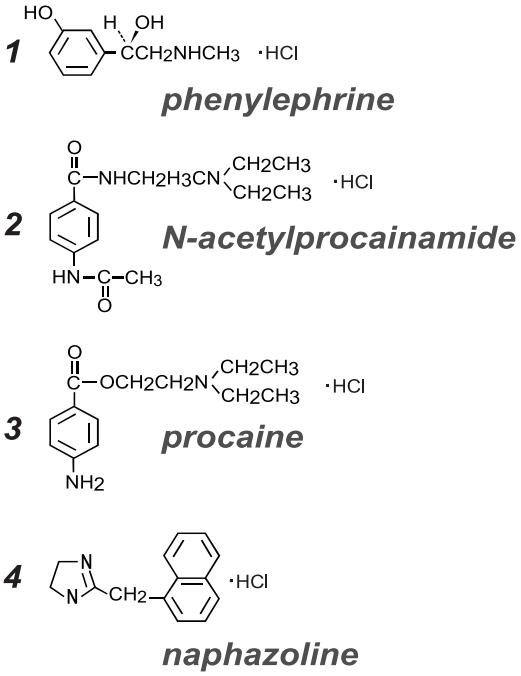
Scherzo SW-C18, 150 x 3 mm
A: 10 mM CH3COONH4
B: 200 mM CH3COONH4 / ACN = 85 / 15
0-100%B (0-45 min)
0.4 mL/min (10 MPa), 37 ° C, 260 nm

Scherzo SW-C18 column applications (Drugs, Metabolites)

Scherzo SW-C18 provides excellent performance for basic drug compounds and ionic metabolites between low and neutral pH conditions due to a small amount of strong anionic / cationic ligands. SW-C18 may be useful for DMPK or metabolome studies.

● Various elution conditions for basic drugs





Scherzo SW-C18, 150 x 3 mm
0.4 mL/min (9 MPa), 37 °C, 260 nm

There are three basic ways to analyze basic compounds on Scherzo SW-C18.
[1] Gradient with formic acid + organic solvent concentration will retain basic compounds as strong positive ions. Various cationic compounds are retained with initial / final formic acid concentration.
[2] Gradient between low concentration of formic acid and high concentration of its salt with organic solvent may separate a wide-range of polar and strong cationic compounds.
[3] Gradient with ionic strength at neutral pH and organic solvent is a very useful easy method to analyze both basic and acidic compounds.

Product Information

Spec.: purified porous silica, 3um particle, 13nm pore, ODS+anion+cation ligand

Column Name	Column I.D.	Column Length	Guard Column
Scherzo SS-C18 *Scherzo* SM-C18 *Scherzo* SW-C18	0.075mm - 0.5mm 1mm, 1.5mm, 2mm, 3mm 4.6mm, 6mm, 10mm	10mm, 20mm, 30mm 50mm, 75mm, 100mm 150mm, 250mm, 500mm	Guard Holder Cartridge Column

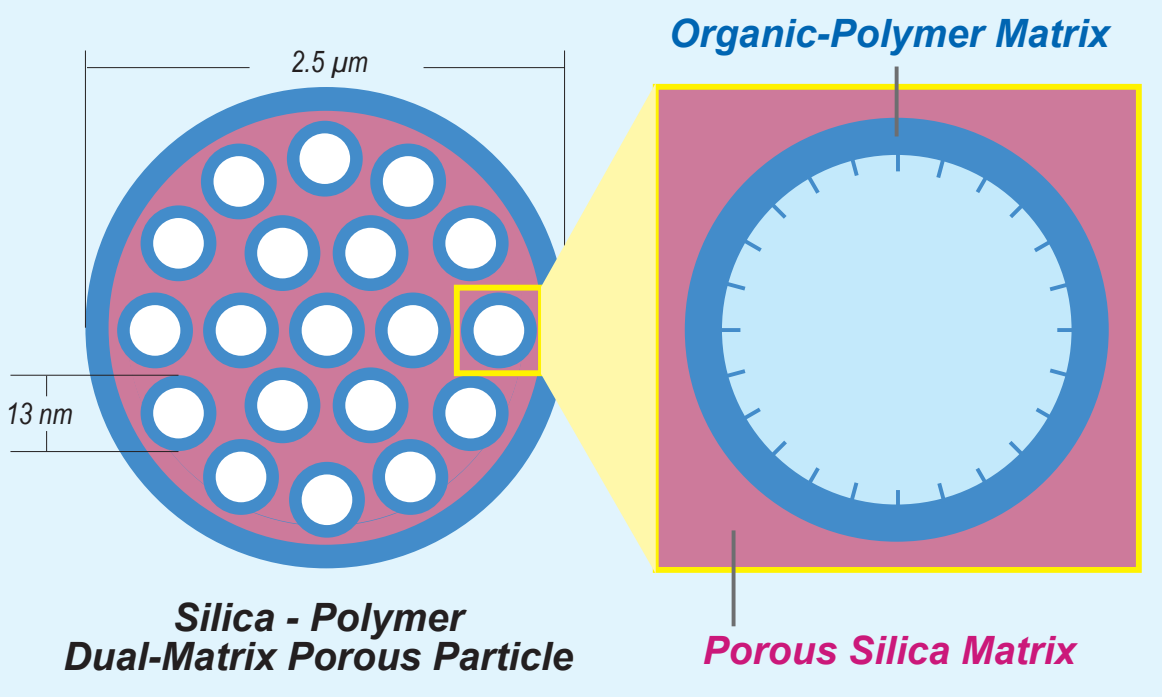
HPLC COLUMN IMTAKT

Porous Silica / Organic Polymer Dual-Matrix ODS

DACAPO DX-C18

2.5µm particles
13nm pore
Porous silica base
Organic Polymer surface
Octadecyl ligand (USP:L1)

Wide pH range 1-12
High-resolution 2.5um particles
UHPLC compatible (500bar)
Simple eluent for LC-MS using ammonium hydroxide
ESI-negative mode for peptides
Alkali sample solution / Alkali column washing



The advantage of using traditional silica-based particles is that they have a high mechanical strength; their disadvantage is that they are prone to degradation under alkali conditions. On the other hand, polymer-based particles are highly resistant to degradation under alkali conditions, but they suffer from poor performance and durability due to shrink/swelling effects when used with organic solvents.

One recent solution to this dilemma is the porous hybrid-silica with alkyl bridge surface treatment. This requires exposure of surface silanols in order to bond the ODS ligands by silylation, which is then followed by an end-capping process. Even when care is taken in this strategy, it is difficult to completely cover all remaining surface silanols, which may negatively affect peak shape and reduce lifetime of the column due to bleeding under alkali conditions.

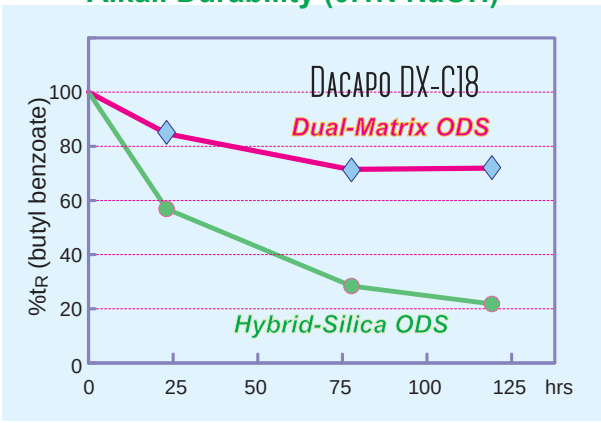
Particle Structure Advantage

DACAPO DX-C18 is the first "Dual-Matrix" structure in the world (see the figure above). It combines the mechanical strength of porous silica with the alkyl stability of polymer-based columns by covering the entire surface with an unprecedented C18/organic polymer matrix. This unique Imtakt exclusive design brings the best of both types of columns into one, with a porous silica matrix providing the ability to withstand high pressures and organic solvents and the organic polymer matrix providing resistance to degradation under alkyl conditions and poor peak shapes caused by unwanted secondary surface silanol interactions.

Wide pH-range Simple alkali eluents for LC-MS analysis

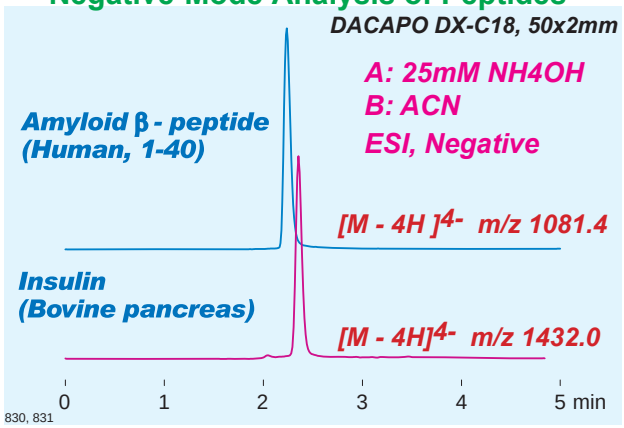
The base structure of the DACAPO material is an innovative chromatography support which consists of both mechanical and alkali stable structures. It is designed specifically for the analysis of peptides, alkaloids, and other compounds under alkali conditions using simple volatile eluents like ammonium hydroxide. This design is also quite useful for the use of high pH sample solutions for injection and/or alkali column washing conditions. The "Dual Matrix" design also provides benefit under acidic conditions, which might be preferable to improve peak shape of basic compounds, by nearly eliminating any silanol effect.

Alkali Durability (0.1N NaOH)



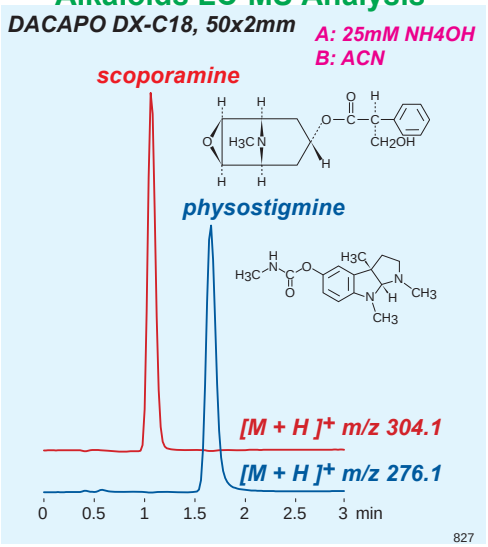
Even though hybrid-silica columns are resistant to alkali degradation, surface silanols are still susceptible to hydrolysis under high pH conditions. The surface silanols of DACAPO are completely covered with an organic polymer layer, dramatically improving alkali stability.

Negative-Mode Analysis of Peptides



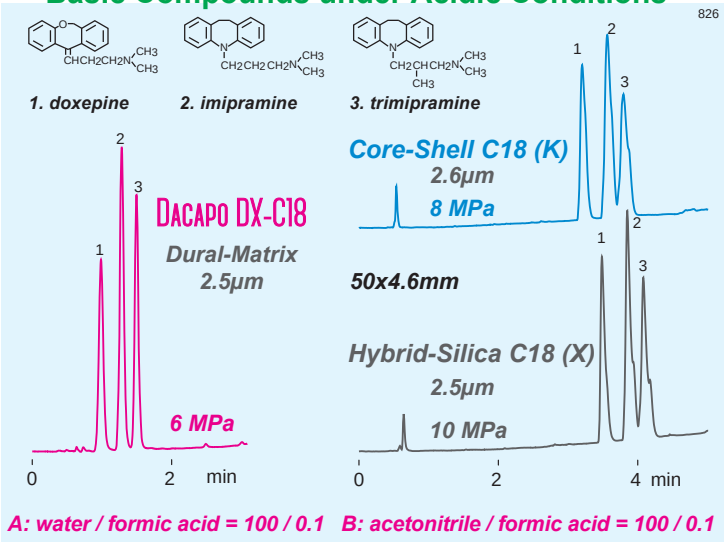
Peptides are negatively charged at pHs above its pI value, so it is better to analyze them under alkali conditions on an LC-MS using ESI-negative mode. There is not much difference in sensitivity when using negative mode under basic conditions, compared to using positive mode under acidic conditions. It may also provide different information that traditional positive mode does not.

Alkaloids LC-MS Analysis



Strong basic compounds, like alkaloids, may show longer retention times, improved peak shape and better MS sensitivity when using alkali eluents.

Basic Compounds under Acidic Conditions



Basic compounds with multivalent ions commonly show splitting peaks due to multiple ionic interactions with exposed surface silanols. DACAPO DX-C18 will provide better peak shape because it does not have any exposed surface silanols.

PRODUCT INFORMATION

2.5µm particle, 13nm pore, C18 ligands, 500bar Max.pressure, M.W. up to 10kDa

NAME	COLUMN I.D.	COLUMN LENGTH	GUARD COLUMN
DACAPO DX-C18	1mm, 2mm, 3mm, 4.6mm	10mm, 20mm, 30mm 50mm, 75mm, 100mm 150mm, 250mmmm	Guard Holder Guard Cartridge DX-C18

Micro/Nano columns are available

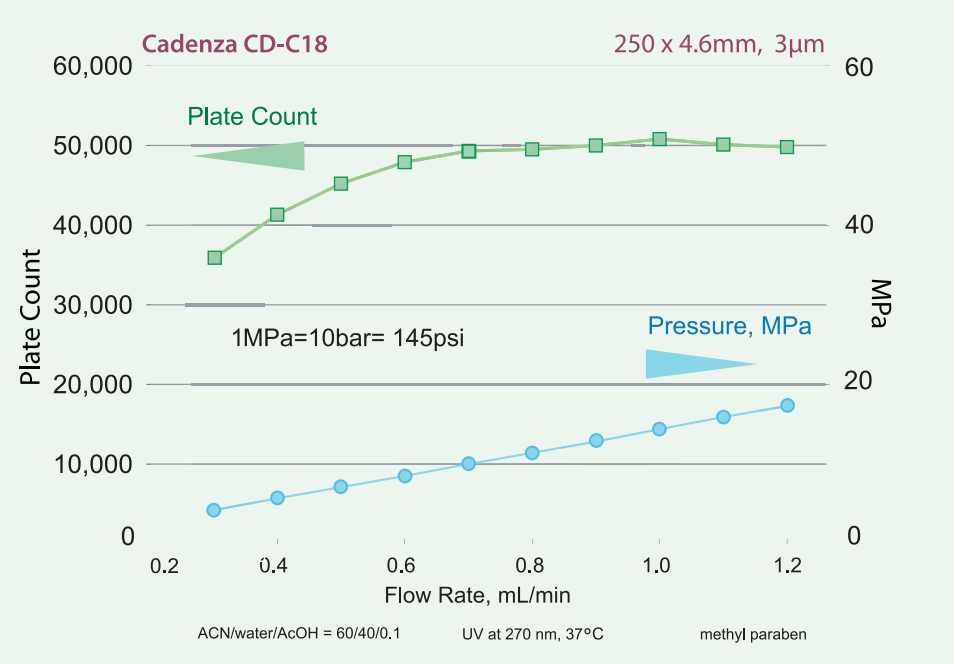
Cadenza CD-C18

Higher Resolution and Lower Back Pressure for HPLC

- Higher Column Efficiency
- Lower Back Pressure
- Better Separation of Hydrophobic Compounds
- Higher Steric Selectivity
- High Plate Count at a Low Flow Rate

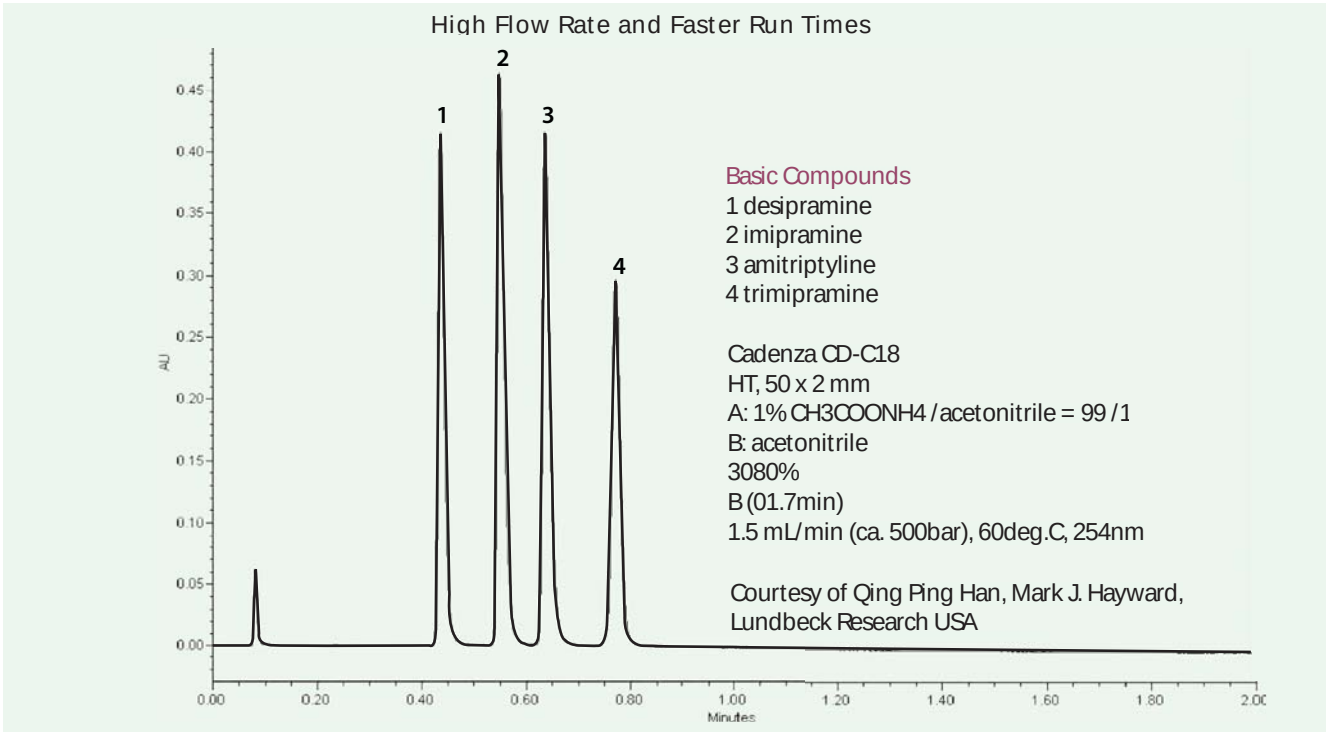
Lower Back Pressure

1.2mL flow rate and only 2,600 psi for 250mm length column



Cadenza CD-C18 offers lower back pressure for a 3µm packing material. In the above graph, a 250 x 4.6mm 3µm Cadenza CD-C18 has pressure of only 50 MPa (500 bar, 7250 psi) with a flow rate of 1.2 mL/min. The graph also shows lower analysis pressure, LC-ESI usage even with a 4.6mm column and decreased solvent consumption.

High Throughput Separation For UHPLC with 3µm Column and High Flow Rate



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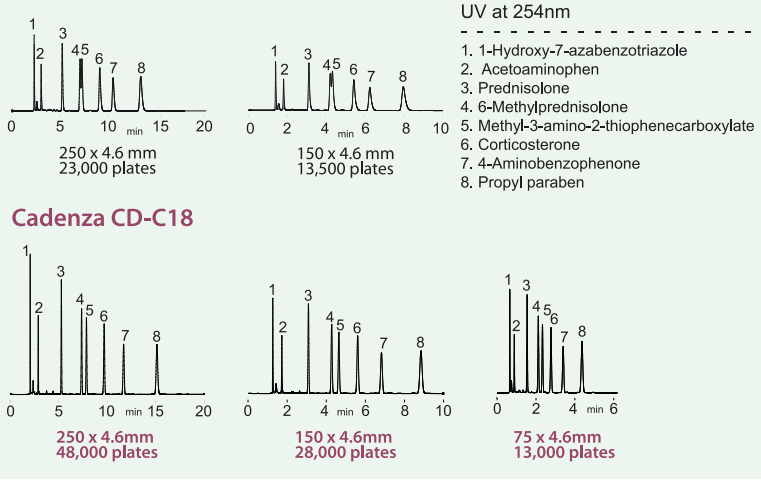
A Revolution in Column Efficiency



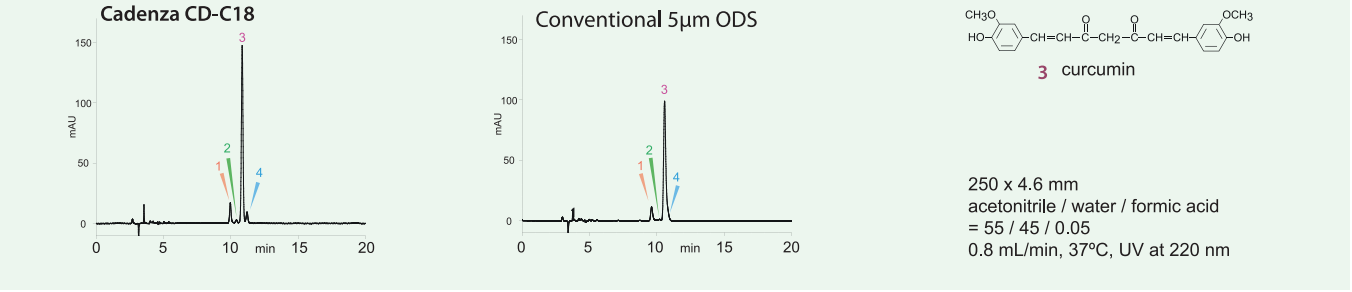
Higher Throughput

Cadenza CD-C18 is a leader in high throughput. Cadenza yields equal or better results than our competitors, but with a shorter column length. This results in three major benefits: shorter analysis time, less solvent use, and more effiecent methods development.

Higher Resolution

As shown in the examples at left, Cadenza CD-C18 provides twice the efficiency of equivalently sized columns. Cadenza CD-C18 demonstrates impressive plate numbers and exceptionally high recognition of molecules in the stationary phase. Cadenza CD-C18 users can expect unprecedented performance. The 250 x 4.6mm columns offer 50,000 plates per column.

250mm 3µm Column Offers Outstanding Resolution

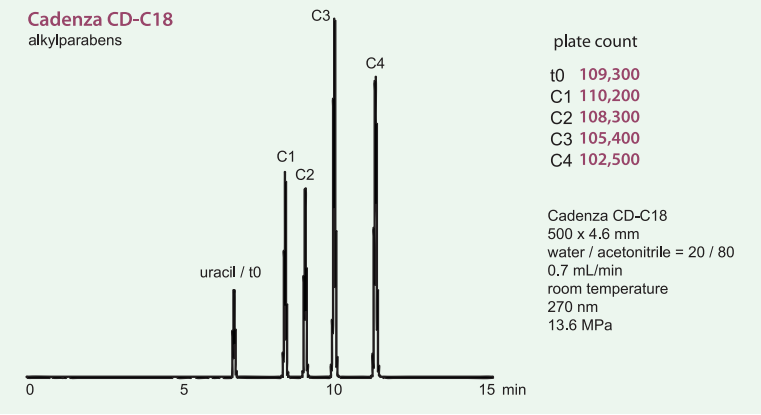


This comparison data demonstrates the high efficiency of Cadenza CD-C18's separation. Curcumin is the main ingredient found in turmeric. When analyzing the market reagent curcumin, a number of impurities are detected, as shown above. Cadenza CD-C18 clearly uncovered three impurities.

Under the exact same conditions, a conventional ODS column did not even detect the impurity shown in peak #2 of Cadenza's chromatogram. Moreover, peak #4 overlapped with the curcumin peak. This level of separation is unsatisfactory.

A high resolution column is essential to check for impurities in natural products and compounds. Cadenza CD-C18's 250 x 4.6mm column proudly offers our users the revolutionary power of 50,000 plates per column, twice the number found in standard columns.

For Maximum Resolution, Use a 500mm Length Column with 3µm Packing Materials



The chromatogram at left shows the performance of a new Cadenza CD-C18 column that is 500mm in length. In the separation of parabens, the 500mm column provides over 100,000 plates for each peak. This includes uracil's peak, which is used as a void marker. The Cadenza packing method is optimized so that our 250 x 4.6mm column provides 50,000 plates as well.

Our technology combines low pressure and high theoretical plates to provide 500mm columns. The 500mm length column offers superior resolution compared to two 250 x 4.6mm columns connected in series.

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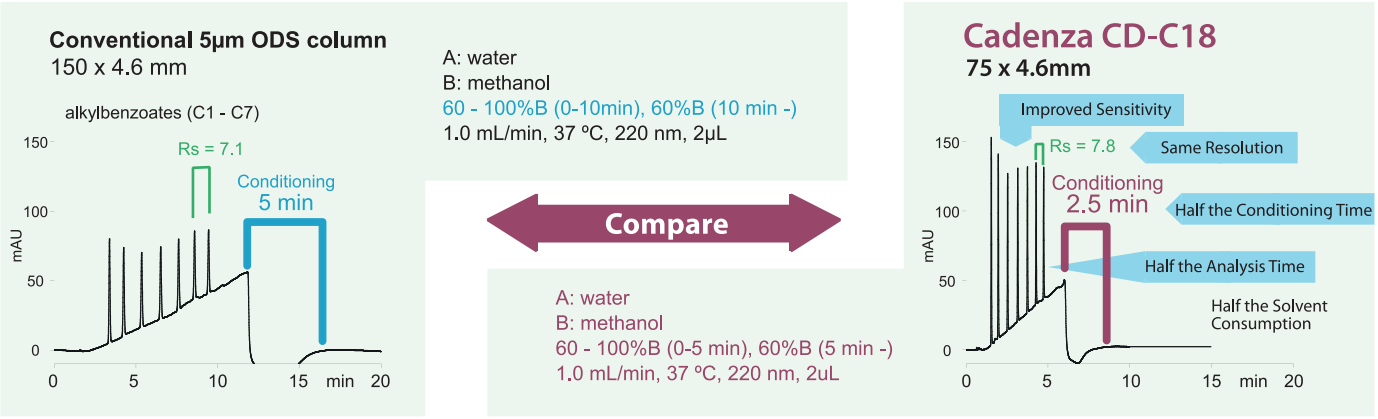
Achieve Higher Efficiencies with Shorter Cadenza CD-C18 Columns



The shorter Cadenza CD-C18 75 x 4.6mm can replace your conventional 150 x 4.6mm and offer you:

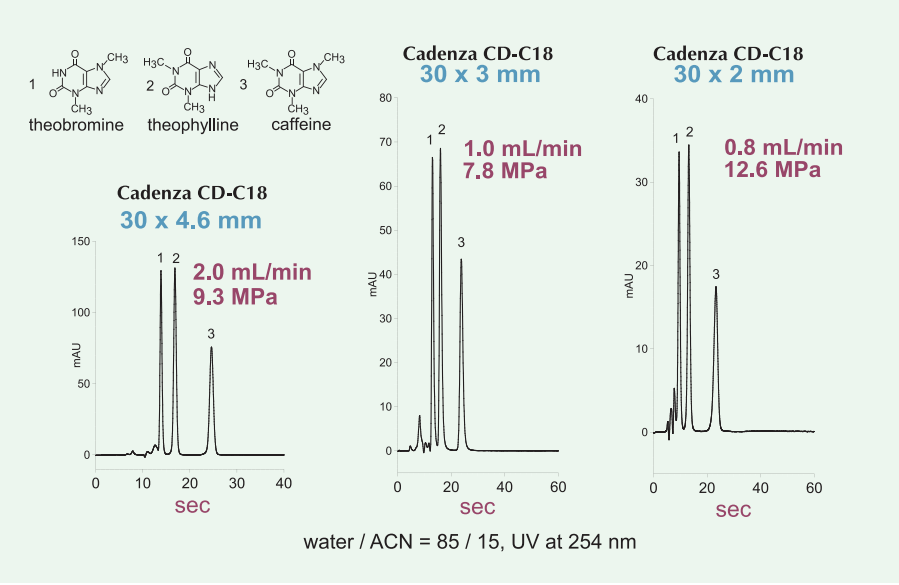
- Similar or improved resolution
- Half the analysis time
- Improved concentration and sensitivity
- Half the conditioning time
- Half the solvent use

A shorter Cadenza column offers the same degree of separation while cutting analysis time and conditioning time in half.

It's easy to switch conditions for gradient analysis. Gradient time is reduced by 50%, while the gradient's initial and final concentration remains the same. In the case of isocratic analysis, the same conditions apply. Cadenza offers improved sensitivity with the same resolution by fully realizing the power of a 3µm particle column design.

Cadenza offers an advantage of 13,000 plates in a 75mm column, double that of a same dimension 5µm ODS column. Achieve the same separation quality as a conventional column with a shorter Cadenza column.

High Speed Analysis with High Flow Rates and Short Columns



For the highest throughput, use the shortest column that gives you sufficient separation and resolution. Cadenza CD-C18 comes in unusually short sizes of 10mm, 20mm, and 30mm, allowing customers to minimize their run times. Because our columns have high efficiency, separation remains satisfactory for most customers when they use our shorter columns to cut run times.

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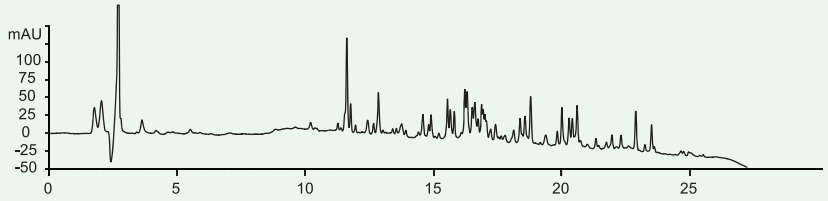
Examples of Peptide Separations

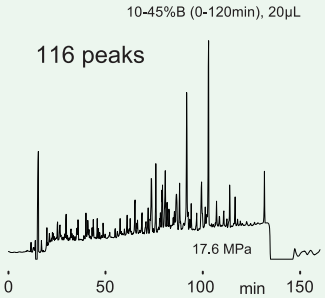
Cadenza CD-C18 150 X 2mm



150 X 2 mm
A: water / TFA = 100 / 0.08
B: acetonotrile / TFA = 100 / 0.05
5%B (0-2min), 5-40%B, 40-90%B (20-25min), 90%B (25-30min), 90-5%B (30-33min)
0.2mL/min
UV at 214 nm
40 ºC
BSA tryptic Digest. 18.5uL (ca. 6.5ug)

Cadenza CD-C18 500 x 4.6 3um Particles

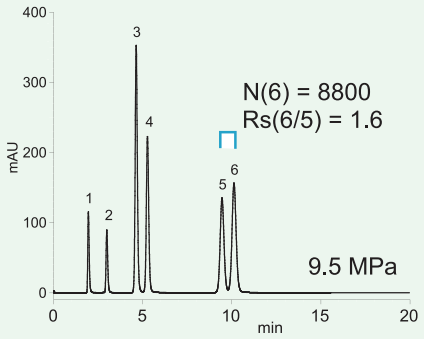
Peptides, Tryptic Digest of α-Casein

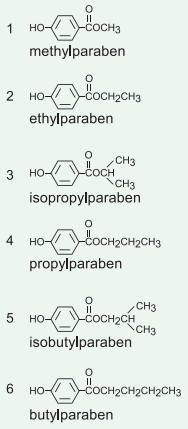


A: water / TFA, B: acetonitrile / TFA
0.5 mL/min, room temperature, 220 nm

Examples of Isomer Separation

Cadenza CD-C18 75 X 2mm





MeOH / water = 55 / 45
0.2 mL/min
30 deg.C
UV at 270 nm

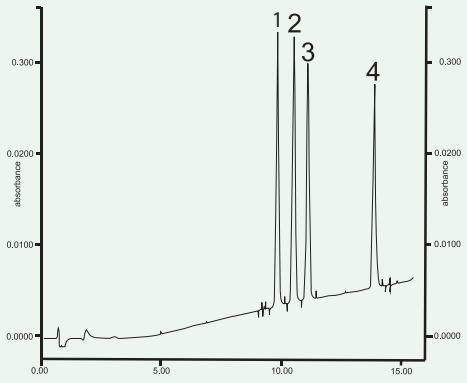
Cadenza CD-C18 excels at separating structural isomers.

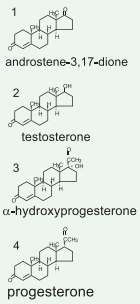
As shown in this separation example, when one compares the separation of paraben isomer structures such as propylparabens and butylparabens, Cadenza provides more plates and better resolution in half the column length.

Cadenza CD-C18 offers quicker results and greater sensitivity under the same separation conditions used for a conventional column.

Examples of Steroid Separations

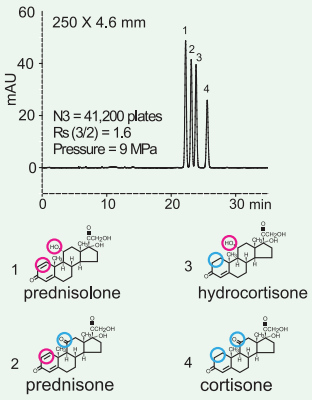
Cadenza CD-C18 75 X 2mm





A: 10% methanol,
B: methanol 30 - 50 %B (0 - 0.5 min),
50 - 80 %B (0.5 - 12.5 min),
100 %B (12.5 min -)
0.3 mL/min
UV at 260 nm
20 µL (500 ppb)

Cadenza CD-C18



water / acetonitrile / acetic acid = 70 / 30 / 0.1
0.5 mL/min, 37 ° C, 260 nm

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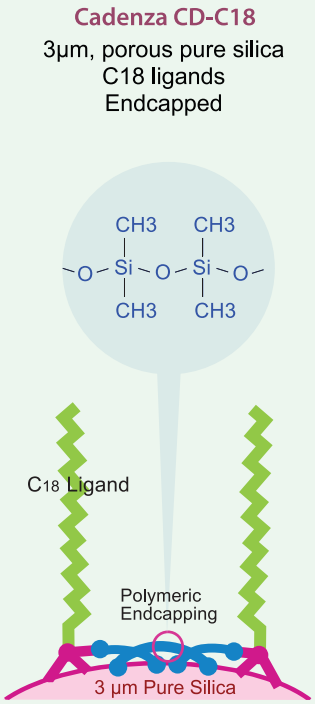
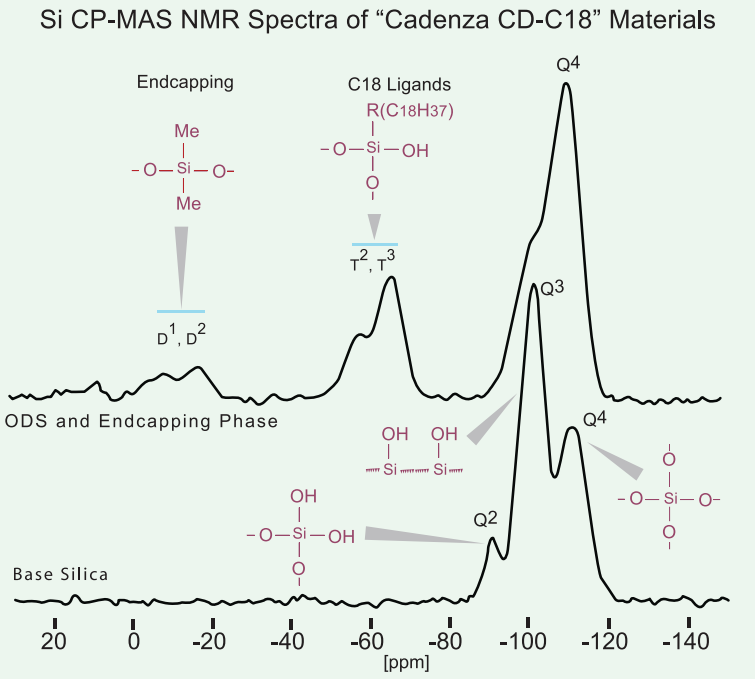
Cadenza CD-C18 Phase Structure

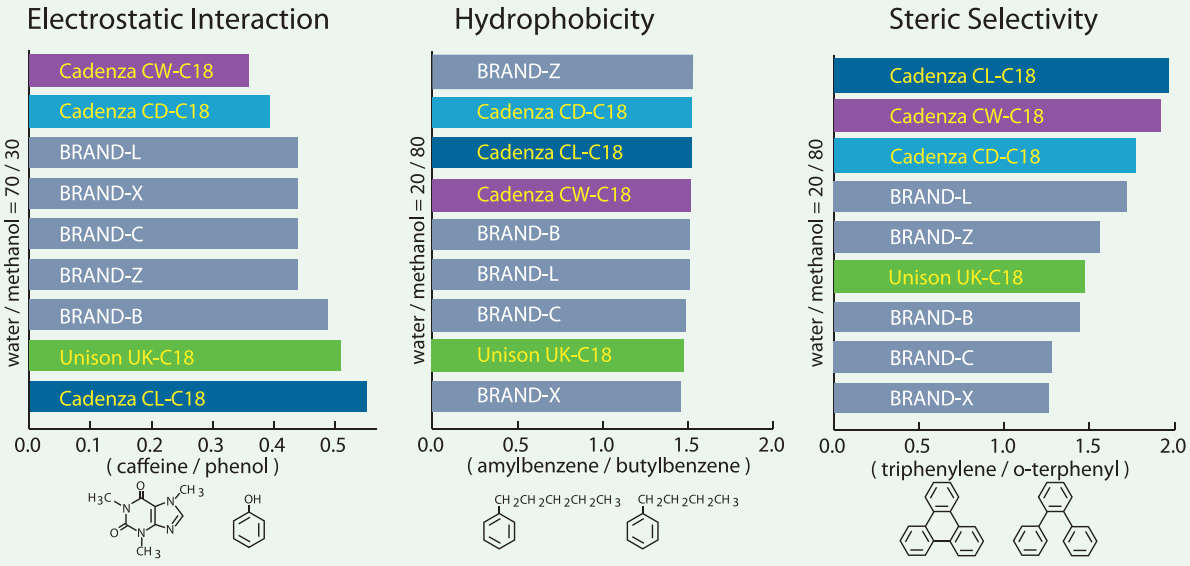




Courtesy of Prof. Dr. Klaus Albert, Univ. of Tübingen

The stationary phase structure model of Cadenza CD- C18 has a novel end-capping technology called "Polymeric Endcapping". This unique phase structure is proven by Si CP-MAS Spectra.

Chromatographic Characteristics



Cadenza CD-C18 is designed to provide hydrophobicity similar to that of other conventional ODS phases. However, Cadenza CD-C18 also offers lower hydrogen bonding capacity and has higher steric selectivity than other columns. These characteristics provide excellent performance for molecular recognition.

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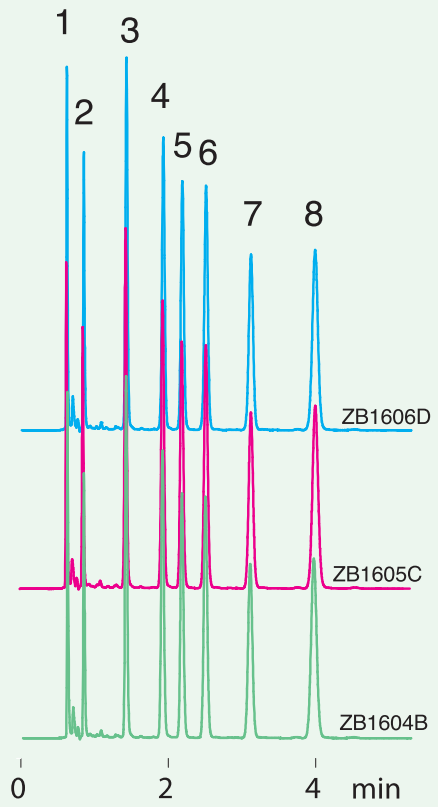
World Class Batch-to-Batch Reproducibility

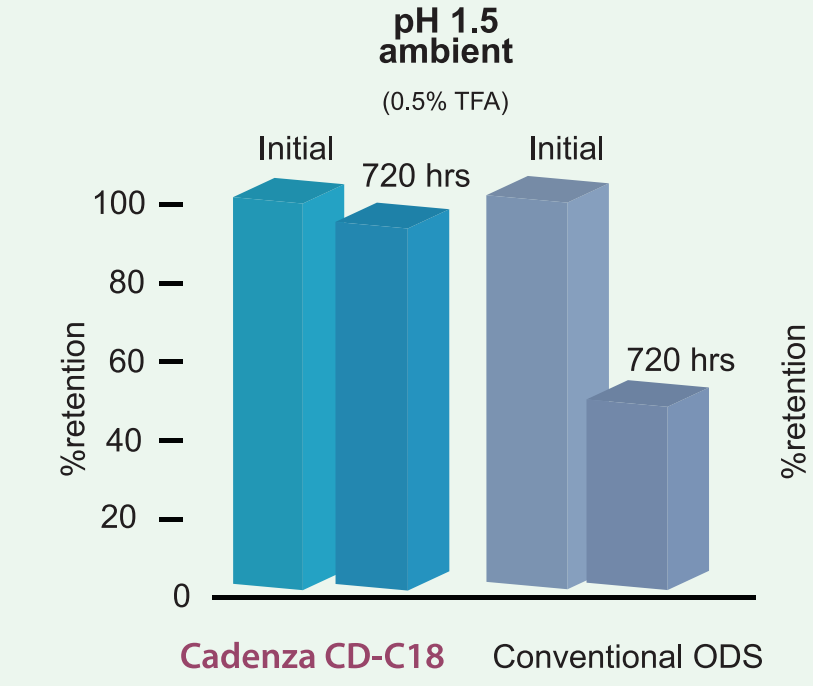


1. 1-Hydroxy-7-azabenzotriazole
2. Acetoaminophen
3. Prednisolone
4. 6-Methylprednisolone
5. Methyl-3-amino-2-thiophenecarboxylate
6. Corticosterone
7. 4-Aminobenzophenone
8. Propyl paraben

Cadenza CD-C18, 75 x 4.6 mm
10 mM CH_3COONH_4 / ACN = 60 / 40
1.0 mL/min, 37 °C
UV at 254 nm

This data demonstrates Cadenza CD-C18's world-class consistency. A drug-related chemical compound was separated using three columns packed with ODS material from different batches. The eluent is neutral pH and LC-MS compatible with volatile and low iconic strength. Even in this quick analysis of multiple ingredients, Cadenza CD-C18's elution peaks show no change in elution peak behavior. The column achieves high-reproducibility even with multiple ingredients including base compounds. Our material processing, ODS substitution method, and end-capping technology guarantees world-class reproducibility through proprietary total design, manufacture, and quality-control techniques.

Excellent Durability Over a Wide pH Range



This data shows Cadenza CD-C18's pH stability.

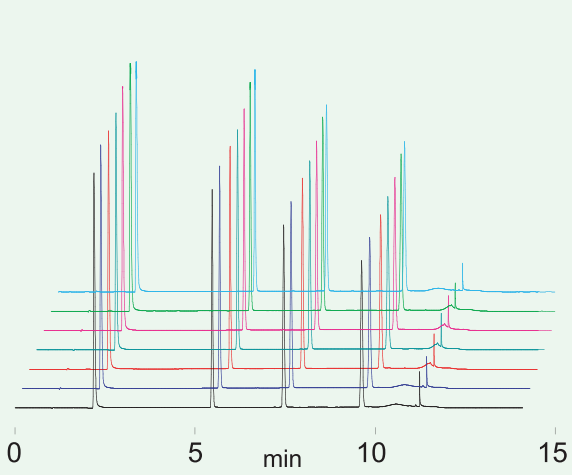
In the water eluent of acids and alkalis (not including organic solvents), we measured the rate of change in column durability after a constant period of exposure to solvent.

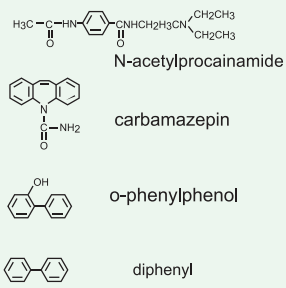
Conventional ODS columns showed a huge change in clumn life with acidic and alkali eluents caused by hydrolysis degradation both of the stationary phase ODS and the endcapping functional group.

Cadenza CD-C18 excels in severe conditions, with little change in rentention despite extreme pH conditions. Cadenza CD-C18's polymeric endcapping eliminates the traditional problems associated with moving from low pH to high pH in the mobile phase.

Column Consistency in Gradient Analysis

Cadenza CD-C18 75 x 4.6mm





Run No.	Rs(2/1)	N(4)	Pressure MPa
1	35.3	176000	8.2
500	35.9	175000	8.5
1000	35.7	175000	8.7
1500	35.9	174000	8.6
2000	33.0	173000	9.0
2500	35.6	176000	8.9
3000	35.8	176000	9.1

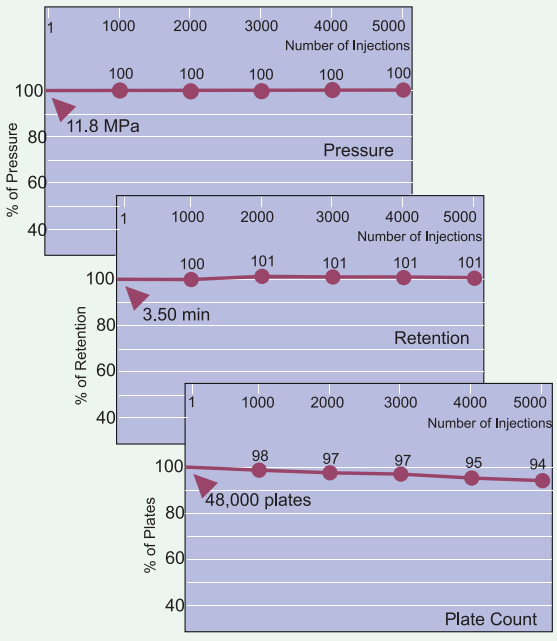
A: 5mM NaH_2PO_4, B: acetonitrile
10 - 90%B (0-10min), 10%B (10-15min)
1.0 mL/min, 37°C, 260 nm

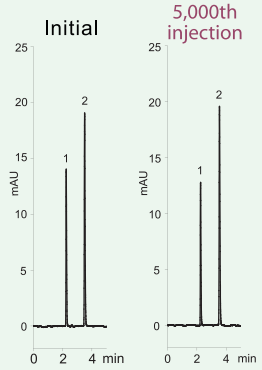
This data shows Cadenza CD-C18's durability through gradient analysis. Gradient analysis is a stressful elution mode for columns. Researchers are concerned about column degradation, particularly through the degradation of packing material that can result after the use of a wide range of organic solvent concentrations.

We examined the column's durability through repeated analysis using gradient elution. There was no column deterioration after 3000 injections under optimized conditions. The basic compound's separation (Peak 1, 2) was also excellent. Under such conditions, it is possible to achieve stable analysis during non-stop 24 hour experimentation.

Column Durability through Repeat Injections

Cadenza CD-C18





250 x 4.6mm
water / ACN / AcOH = 40 / 60 / 0.1
1.0 mL/min, 37°C, 270 nm
1. uracil, 2. butylparaben, 2µL

This data shows the column life of Cadenza CD-18 under inspection conditions.

We conducted a repeat injection experiment with an optimized Cadenza. The resulting packing situation yielded over 90% of the normal plate numbers, even after 5000 injections. There was little effect on column life or column pressure.

The column life changes dramatically with temperature, pH, and mobile phase composition. While this experiment's results may not apply to all situations, the Cadenza CD-C18 offers the industry s highest efficiency in processing the most samples possible.

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Ordering Information for Cadenza CD-C18

3µm Columns, Pressure limits of up to: 50MPa, 500 bar, 7,500 psi					
	ID				
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm
10			CD020T	CD030T	CD000T
20			CD029T	CD039T	CD009T
30	CD011T	CD071T	CD021T	CD031T	CD001T
50	CD012T	CD072T	CD022T	CD032T	CD002T
75	CD013T	CD073T	CD023T	CD033T	CD003T
100	CD014T	CD074T	CD024T	CD034T	CD004T
150	CD015T	CD075T	CD025T	CD035T	CD005T
250	CD016T	CD076T	CD026T	CD036T	CD006T

3µm,100MPa,1000 bar, 15,000 psi	
Column Length	ID
	2.0 mm
10	
20	
30	CD021U
50	CD022U
75	CD023U
100	CD024U
150	CD025U
250	CD026U

3µm Columns, Pressure limits of up to: 20MPa, 250 bar, 3,000 psi							
	Internal Diameter						
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
10			CD020	CD030	CD000		
20			CD029	CD039	CD009		
30	CD011	CD071	CD021	CD031	CD001	CD061	CD0P1
50	CD012	CD072	CD022	CD032	CD002	CD062	CD0P2
75	CD013	CD073	CD023	CD033	CD003	CD063	CD0P3
100	CD014	CD074	CD024	CD034	CD004	CD064	CD0P4
150	CD015	CD075	CD025	CD035	CD005	CD065	CD0P5
250	CD016	CD076	CD026	CD036	CD006	CD066	CD0P6
500					CD007		

Guard Column System for Cadenza CD-C18							
	Internal Diameter						
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M
Guard Cartridge (Set of 3)	GCCD0C	GCCD0C	GCCD0S	GCCD0S	GCCD0S	GCCD0S	GCCD0M

5µm Columns, Pressure Limits of up to: 20MPa, 200 bar, 3,000 psi										
	Internal Diameter									
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.0 mm	4.6 mm	6.0 mm	10.0 mm	20.0 mm	28.0 mm
30	5CD011	5CD071	5CD021	5CD031		5CD001	5CD061	5CD0P1		
50	5CD012	5CD072	5CD022	5CD032		5CD002	5CD062	5CD0P2	5CD0Q2	
75	5CD013	5CD073	5CD023	5CD033		5CD003	5CD063	5CD0P3		
100	5CD014	5CD074	5CD024	5CD034		5CD004	5CD064	5CD0P4	5CD0Q4	
150	5CD015	5CD075	5CD025	5CD035	5CD045	5CD005	5CD065	5CD0P5	5CD0Q5	
250	5CD016	5CD076	5CD026	5CD036	5CD046	5CD006	5CD066	5CD0P6	5CD0Q6	5CD0R6

Guard Column System for Cadenza 5CD-C18										
	Internal Diameter									
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.0 mm	4.6 mm	6.0 mm	10.0 mm	20.0 mm	28.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M	GCH02M	GCH02M
Guard Cartridge (Set of 3)	GC5CD0C	GC5CD0C	GC5CD0S	GC5CD0S	GC5CD0S	GC5CD0S	GC5CD0S	GC5CD0M	GC5CD0M	GC5CD0M

All of our stationary phases can also be made in the following internal diameters:
Nano: 0.05mm, 0.075mm Capillary: 0.1mm, 0.3mm, 0.5mm Semi-Prep: 20mm, 28mm

Four Easy Ways To Order:
1. Call us at (215) 665-8902
2. Order by fax (501) 646-3497
3. Through VWR (vendor code 8070779) or Fisher (vendor code VN101253)
4. Via www.imtaktusa.com with any major credit card

info@imtaktusa.com
www.imtaktusa.com
215-665-8902

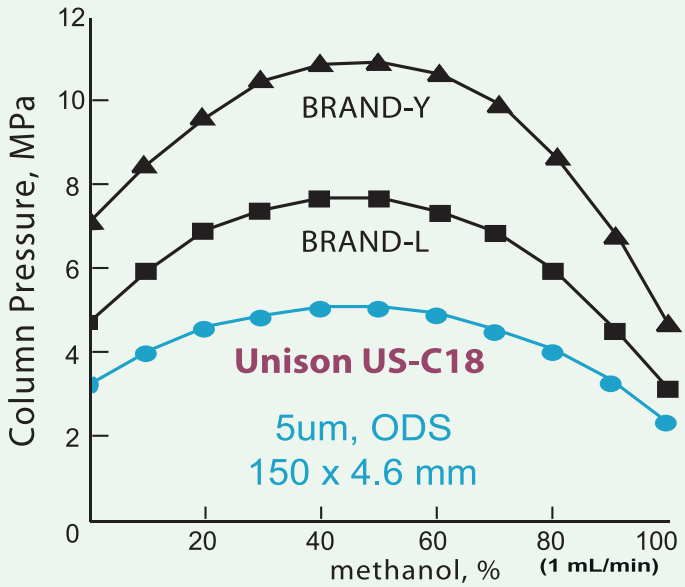
Imtakt USA

Unison UK-C18

Higher Resolution and Lower Back Pressure

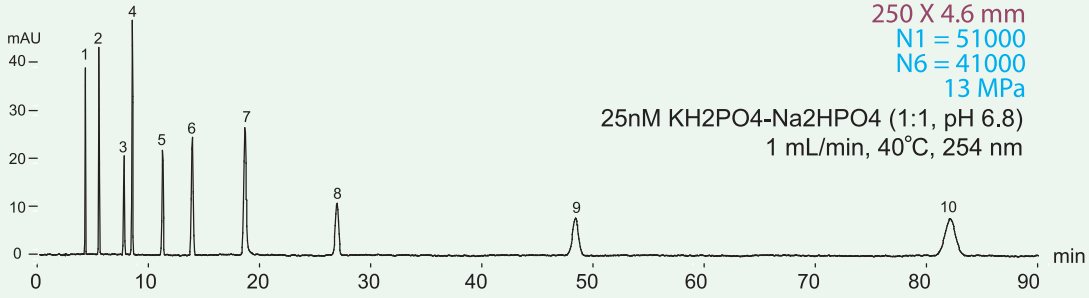
Lower Back Pressure

- Higher Column Efficiency
- Lower Back Pressure
- World Class Reproducibility
- LC-MS compatible
- No Phase Collapse in 100% Aqueous Elution



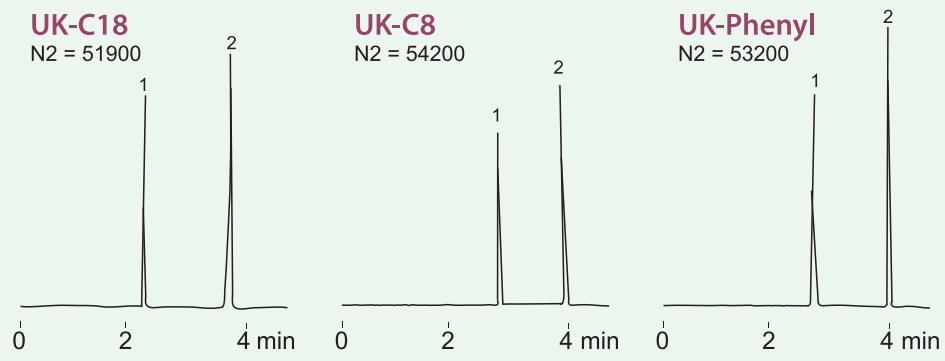
Note: 1MPa = 145 psi

Unison Family Offers High Resolution Analysis



250 X 4.6 mm
N1 = 51000
N6 = 41000
13 MPa
25nM KH2PO4-Na2HPO4 (1:1, pH 6.8)
1 mL/min, 40°C, 254 nm

1 cytosine	6 thymine
2 uracil	7 adenine
3 cytidine	8 guanosine
4 guanine	9 thymidine
5 uridine	10 adenosine



1. uracil, 2. methylbenzoate
water / ACN / AcOH = 40 / 60 / 0.1.
1 mL/min, 270 nm

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www.imtaktusa.com
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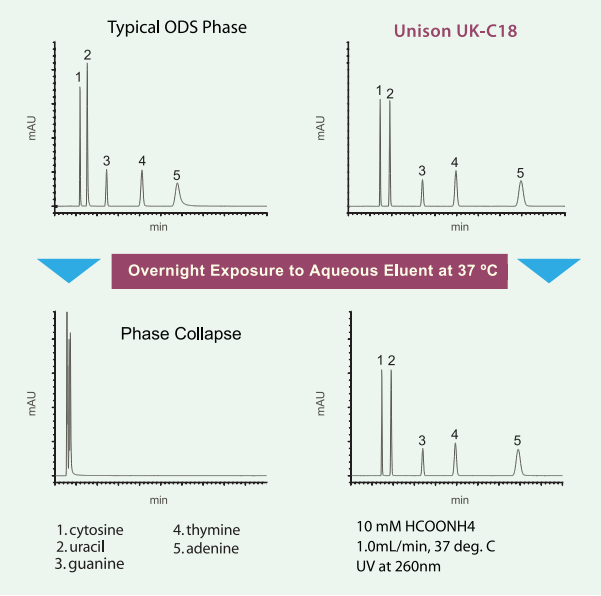
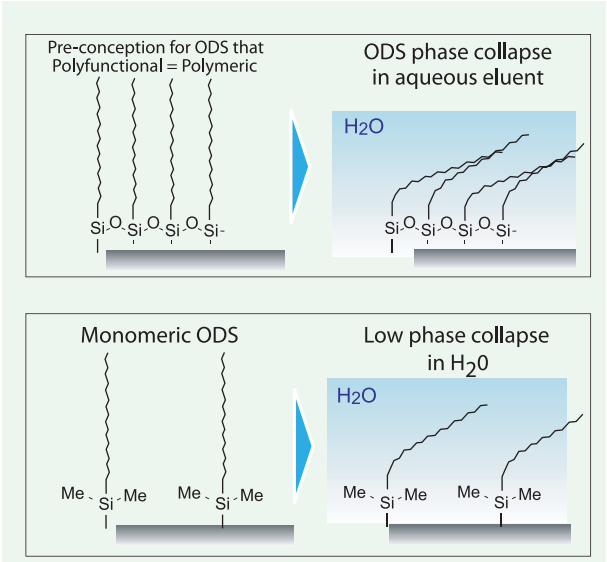
Avoid Phase Collapse

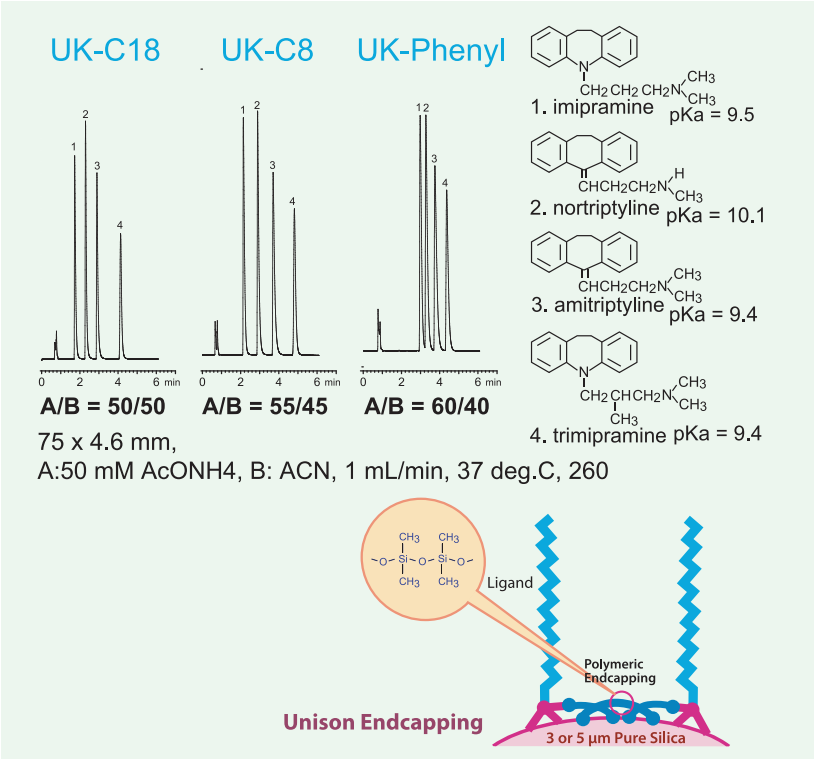




Conventional ODS silica phases, which are designed for the separation of polar compounds, usually have lower coverage than silica stationary phases. This is necessary to avoid phase collapse. However, Unison provides a medium coverage ODS phase, employing a trifunctional component and proprietary endcappaing technique, which results in a phase that is stable to under pH 1.5. Imtakt, Unison's manufacturer, was the first to develop this novel approach in 1999.

Typical C18 columns experience phase collapse in 100% aqueous eluent, which results in loss of retention, leading to poor separation and reproducibility. However, Unison UK-C18 prevents phase collapse and provides stable retention, even for nucleic bases under hydrophobic conditions.

Unique Endcapping



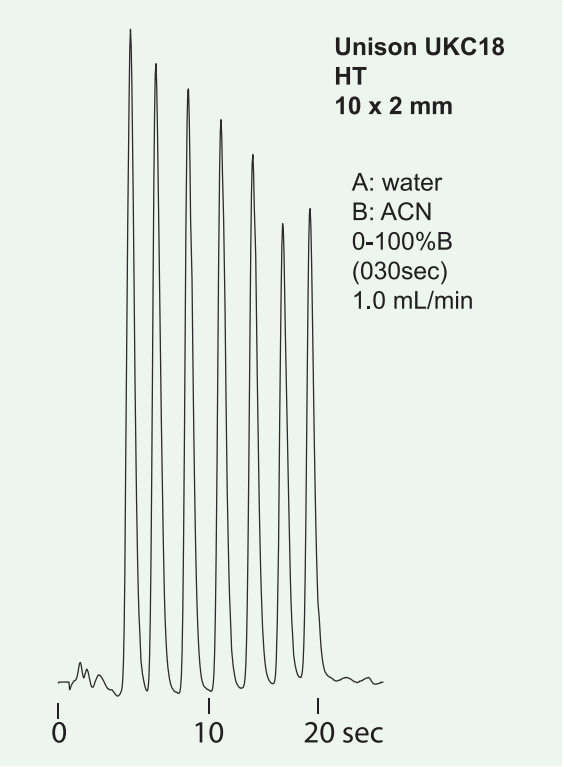
Unison employs a unique endcapping technology. As a result, the column provides excellent elution characteristics for difficult separations, such as that of basic compounds. This applies not only to ODS, but also to C8 and phenyl columns.

For basic anti-depressant drugs, which exhibit a high pK_a value, all of our stationary phases show excellent peak shape. Separation is possible with the use of ammonium acetate, a volatile buffer for LC-MS, avoiding the need for inorganic salts typically used in LC-UV analysis, such as phosphate buffers.

info@imtaktusa.com
www.imtaktusa.com
215-665-8902

Imtakt USA

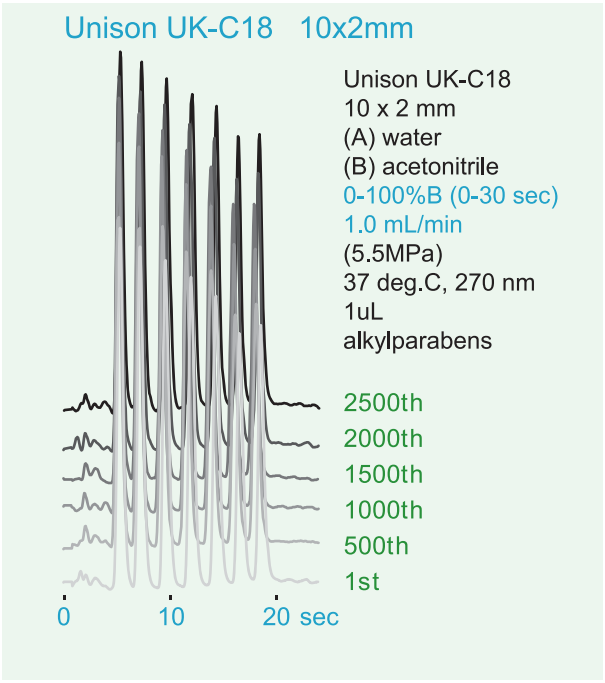
High Throughput Unison C18 Columns



<1 minute run times

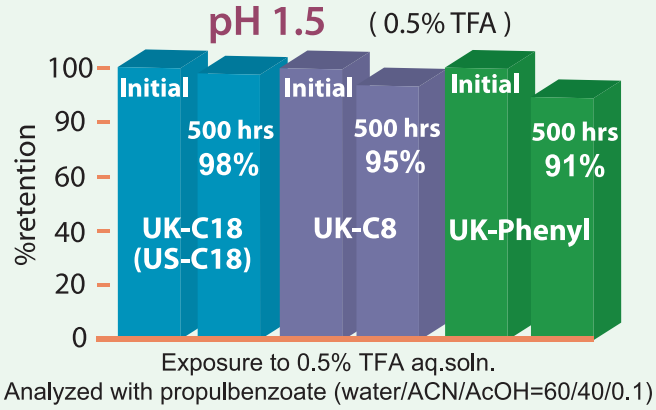
- Ultra high flow rates with 3µm particles that can handle higher pressure
- Three different versions of UK-C18: 250 bar, 500 bar, and 1,000 bar
- Various internal diameters: (1, 1.5, 2, 3, 4, 4.6mm)

Experience Faster Throughput



For superior throughput, take advantage of Unison's high efficiency by using a shorter column. Many customers have cut their run times drastically by using our 10mm, 20mm, and 30mm column lengths, while still achieving satisfactory separation. All of these column lengths come with 3um silica packing material. We advise our customers to test increasingly shorter columns until they find the optimal trade-off between speed and separation.

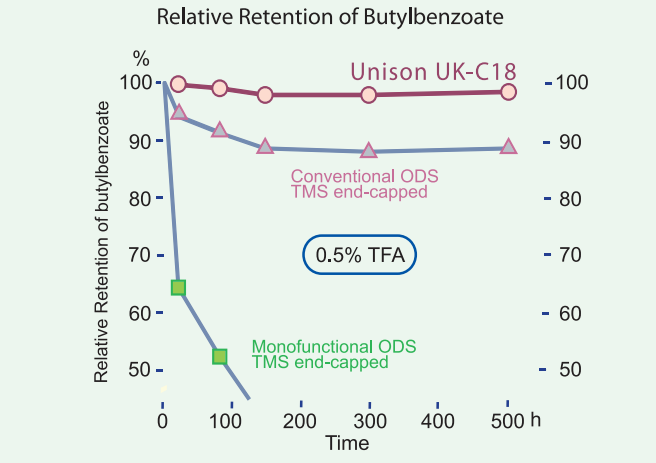
Unison pH Range and Durability



Unison stationary phase possesses high durability, with both acidic and alkali elutions.

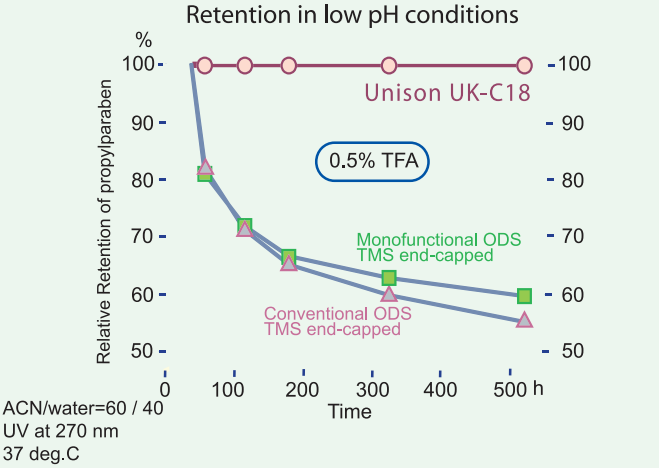
Our unique endcapping provides C8, phenyl, and C18 phases with improved durability for a wide pH range.

Strong Acid Stability

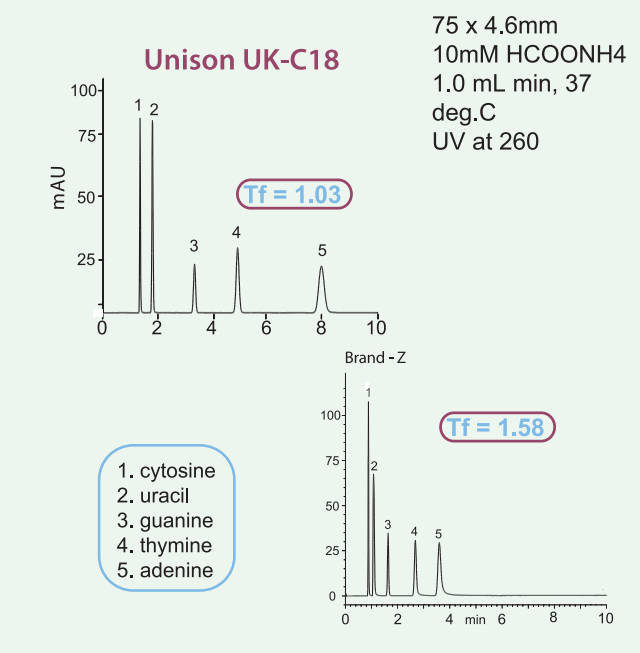


Our studies show that trifunctional, TMS endcapped stationary phases provide greater stability under extreme acidic conditions (pH 1.5) when compared to traditional monofunctional ODS TMS endcapped columns.

Unison UK-C18 provides the best stability. Our proprietary endcapping is the key to hydrophillic compound separations under acidic conditions.

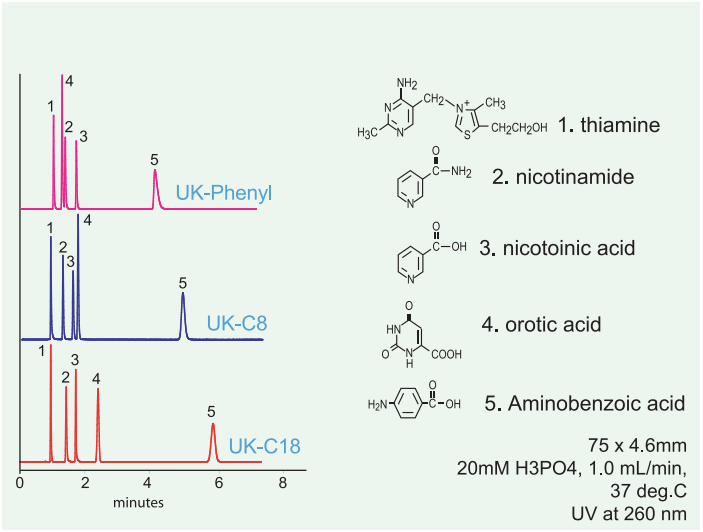


Separation of Polar Compounds

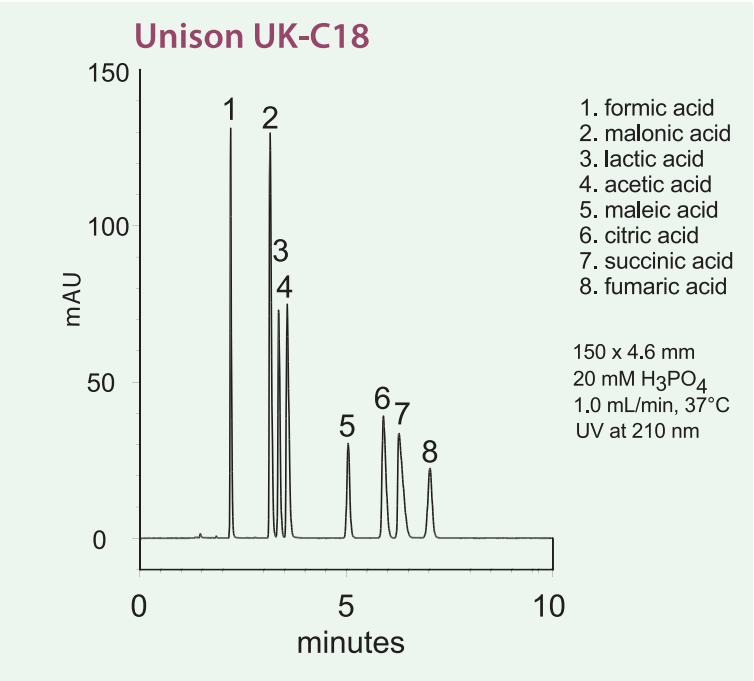


Nucleic bases, especially adenine, frequently give poor peak symmetry on commercial ODS columns under hydrophilic conditions.

Unison UK-C18 provides excellent peak symmetry and separation for these compounds and for other polar compounds. All of the Unison phases excel at the separation of polar compounds.



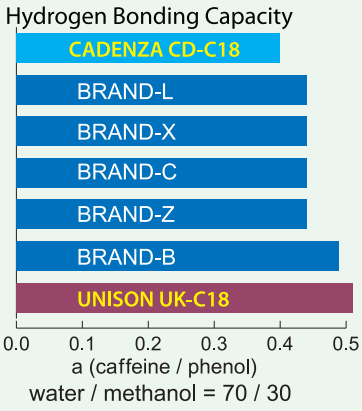
Organic Acids in Low pH

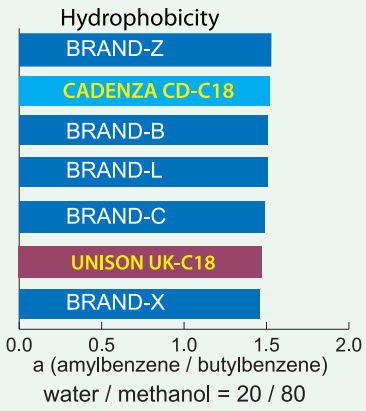


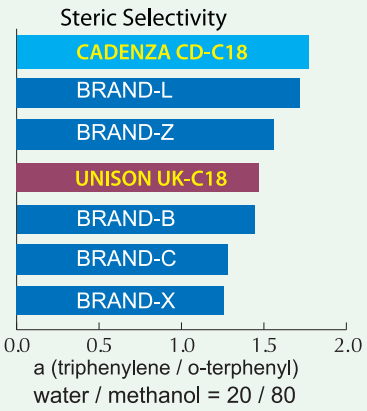
Reverse phase separation of organic acids is difficult. Unison UK-18 provides exceptional separation and peak shapes.

Conventional separations of organic acids use a 250mm column, but Unison delivers comparable separations with a shorter 150mm column.

Hydrogen Bonding Capacity / Hydrophobicity / Steric Selectivity

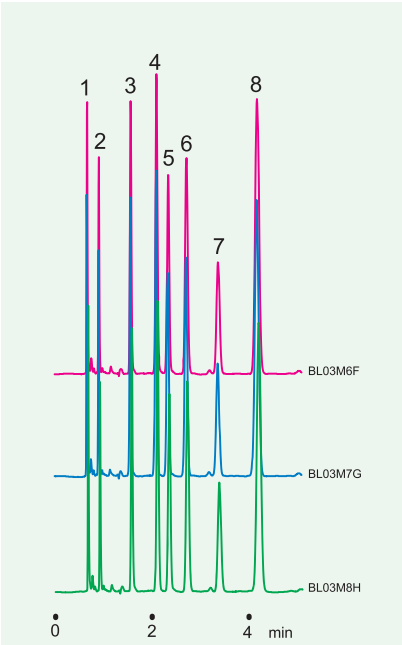






- The big difference in hydrogen bonding capacity is that Unison offers longer retention of high polarity compounds. Unison's unique technology offers hydrogen bonding capacity even after a high degree of endcapping.
- Unison technology provides outstanding steric selectivity, an important advantage when compounds have similar molecular structures.
- Hydrophobicity is the key interaction to determine material retention. Other high-polarity column technologies usually have lower hydrophobicity, which lessens retention. Unison technology does not require reductions of hydrophobicity, which is one of the underlying reasons for Unison's superior resolution.

Excellent Batch-to-Batch Reproducibility



Unison UK-C18, 75 x 4.6 mm
1.0 mL/min, 37 deg.C, 254 nm
20mM ammonium acetate / ACN = 60/40

1 1-hydroxy-7-azabenzotriazole

2 acetaminophen

3 prednisolone

4 6-alpha-methylprednisolone

5 methyl 3-amino-2-thiophenecarboxylate

6 corticosterone

7 4-aminobenzophenone

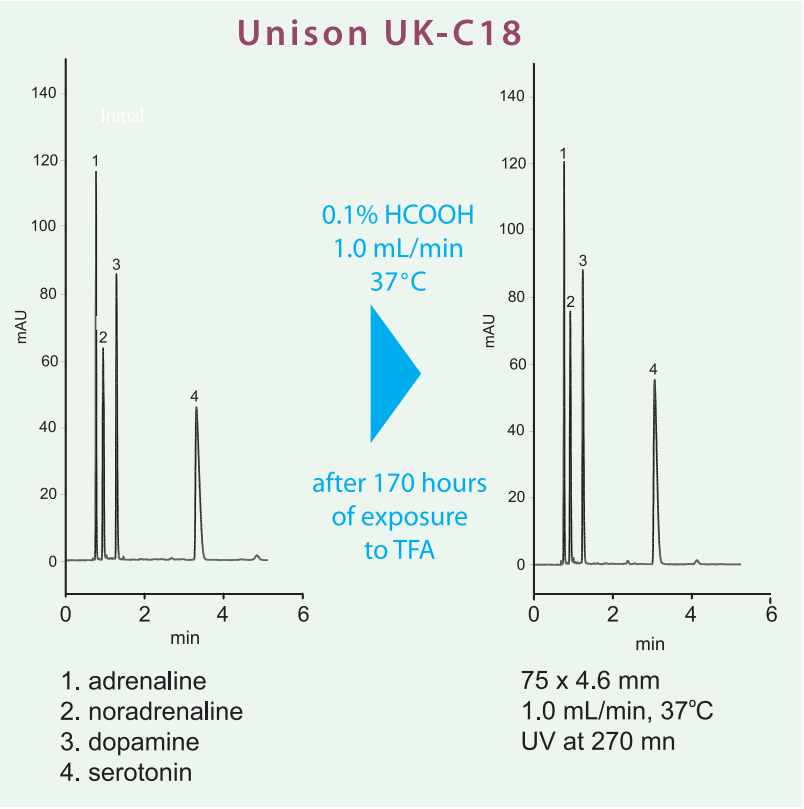
8 propylparaben

This data shows the exceptional batch-to-batch reproducibility for Unison UK-C18, a column packed with high efficiency 3um C18 silica particles.

The Unison series packing material is manufactured in a proprietary manner different from conventional methods, achieving not only high-efficiency packing material but also high levels of batch-to-batch reproducibility.

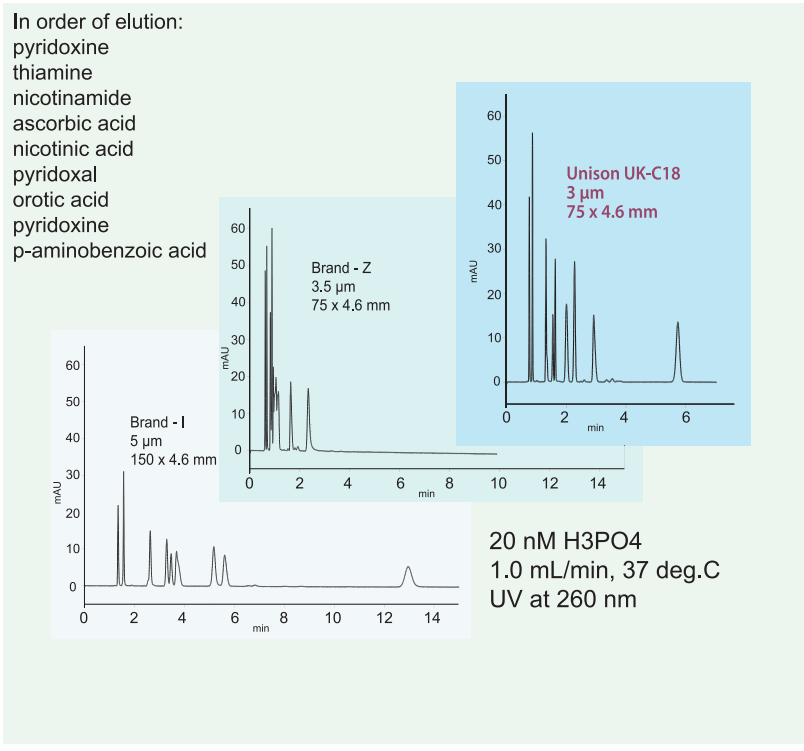
Our supplier puts incredible consideration into their manufacturing process in order to provide users with the highest product quality.

Excellent Retention in Acidic Aqueous Eluent



Formic acid is important for LC-MS. The new ODS phase, Unison UK-C18, shows excellent stability for catecholides after 170 hours of exposure to 0.1% TFA.

Excellent Vitamin Separation



Hydrophillic vitamins are important analytes and require aqueous eluent under acidic conditions for optimized separation.

Using phosphoric acid eluent, Unison UK-C18 gives excellent peak shapes and rapid separation compared to convemtional 5um, 150mm columns, and 3.5um, 150mm columns.

Ordering Information for Unison UK-C18

3µm Column, Pressure limits of up to: 50MPa, 00 bar, 7,500 psi					
	Internal Diameter				
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm
10			UK020T	UK030T	UK000T
20			UK029T	UK039T	UK009T
30	UK011T	UK071T	UK021T	UK031T	UK001T
50	UK012T	UK072T	UK022T	UK032T	UK002T
75	UK013T	UK073T	UK023T	UK033T	UK003T
100	UK014T	UK074T	UK024T	UK034T	UK004T
150	UK015T	UK075T	UK025T	UK035T	UK005T
250	UK016T	UK076T	UK026T	UK036T	UK006T

3µm, 100MPa,1000 bar, 15,000 psi	
Column Length	ID
	2.0 mm
10	
20	
30	UK021U
50	UK022U
75	UK023U
100	UK024U
150	UK025U
250	UK026U

3µm Column, Pressure limits of up to: 20MPa, 250 bar, 3,000 psi							
	Internal Diameter						
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
10			UK020	UK030	UK000		
20			UK029	UK039	UK009		
30	UK011	UK071	UK021	UK031	UK001	UK061	UK0P1
50	UK012	UK072	UK022	UK032	UK002	UK062	UK0P2
75	UK013	UK073	UK023	UK033	UK003	UK063	UK0P3
100	UK014	UK074	UK024	UK034	UK004	UK064	UK0P4
150	UK015	UK075	UK025	UK035	UK005	UK065	UK0P5
250	UK016	UK076	UK026	UK036	UK006	UK066	UK0P6
500					UK007		

Guard Column System for Unison UK-C18							
	Internal Diameter						
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M
Guard Cartridge (Set of 3)	GCUK0C	GCUK0C	GCUK0S	GCUK0S	GCUK0S	GCUK0S	GCUK0M

Pricing Grid For Unison US-C18 Columns, 5µm										
	Internal Diameter									
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.0 mm	4.6 mm	6.0 mm	10.0 mm	20.0 mm	28.0 mm
10						US000				
30	US011	US071	US021	US031		US001	US061	US0P1		
50	US012	US072	US022	US032		US002	US062	US0P2	US0Q2	
75	US013	US073	US023	US033		US003	US063	US0P3		
100	US014	US074	US024	US034		US004	US064	US0P4	US0Q4	
150	US015	US075	US025	US035	US045	US005	US065	US0P5	US0Q5	
250	US016	US076	US026	US036	US046	US006	US066	US0P6	US0Q6	US0R6

Guard Column System for US-C18										
	Internal Diameter									
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.0 mm	4.6 mm	6.0 mm	10.0 mm	20.0 mm	28.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M	GCH02M	GCH02M
Guard Cartridge	GCUS0C	GCUS0C	GCUS0S	GCUS0S	GCUS0S	GCUS0S	GCUS0S	GCUS0M	GCUS0M	GCUS0M
(Set of 3)										

All of our stationary phases can also be made in the following internal diameters:
Nano: 0.05mm, 0.075mm Capillary: 0.1mm, 0.3mm, 0.5mm Semi-Prep: 20mm, 28mm

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4. Via www.imtaktusa.com with any major credit card

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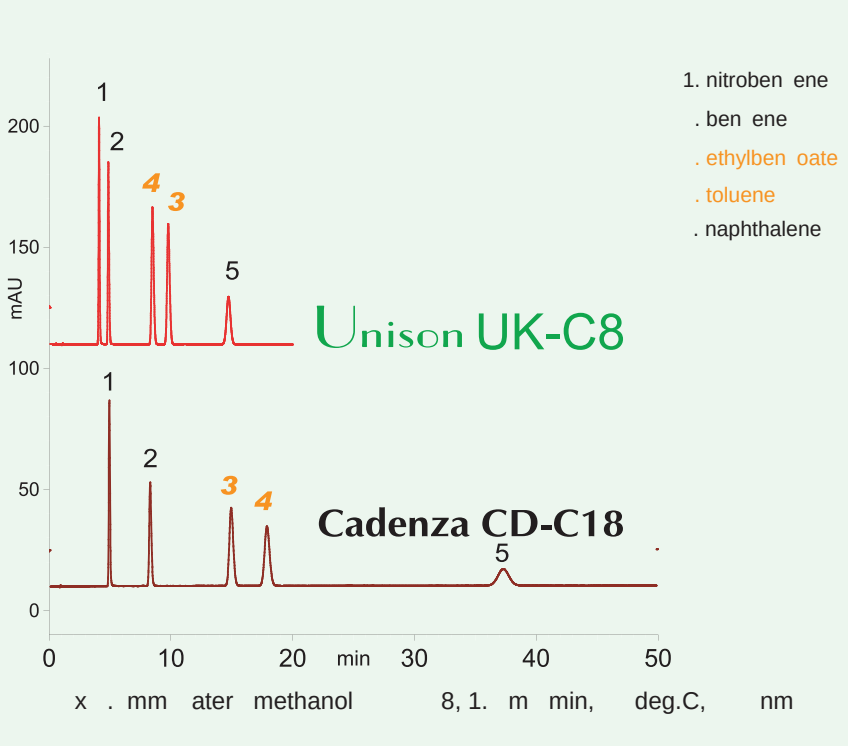
Imtakt USA

Unison UK-C8

Polar to Non-Polar Compounds, Basic Compounds

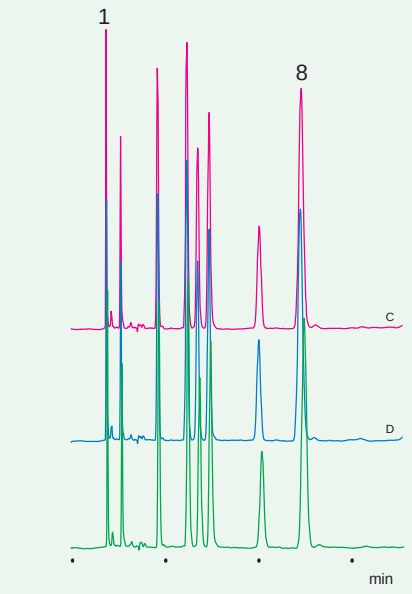
etter alancer and igher-Speed Separation than ODS

- Shorter retention times and faster elution than ODS counterparts
- Optimal hydo-phobility and electrostatic interaction
- Superior batch-to-batch reproducibility



Conventional C8 columns are kno n for short retention times and faster elution than their ODS counterparts. Unison UK-C8 provides optimal hydrophobicity and electrostatic interation-enabling scientists to reduce analysis time and achieve acceptable separation.

anufacturing atch to atch eproducibility



Unison UK-C8, x . mm
m ammonium acetate ACN
1. m min, C, nm

1 1-hydroxy- -a aben otria ole

acetaminophen

prednisolone

-alpha-methylprednisolone

methyl -amino- -thiophenecarboxylate

corticosterone

-aminoben ophenone

8 propylparaben

his data sho s the exceptional batch-to-batch reproducibility for Unison UK-C8, a column packed ith high-efficiency um C8.

he Unison series packing material is manufac-tured in a proprietary manner different from conventional methods. his development as completed to not only achieve high-efficiency packing material but also to provide high levels of batch-to-batch reproducibility.

e put great consideration and time into our manufacturing in order to provide users ith the highest levels of product quality.

info@imtaktusa.com
www.imtaktusa.com
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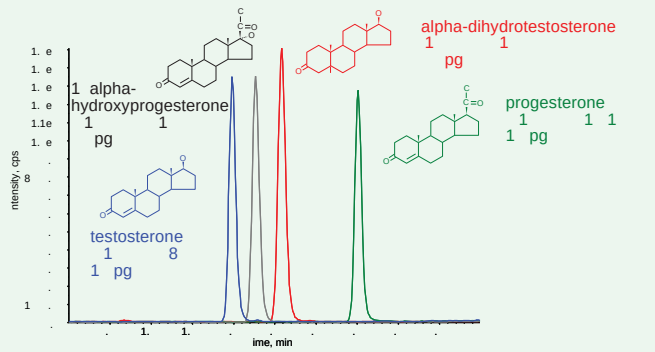
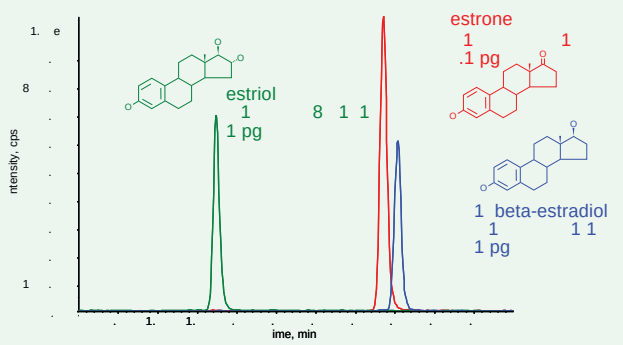
C- S S Application - Steroid ormones and etabolites



Unison UK-C8, x mm
.1 COO aq. - .1 COO in ACN
. m min, 1 u
A AKA A O NC.
S , positive

Courtesy of AKA A O NC.



Unison UK-C8, x mm
. m min, 1 u
1 m AcON - acetonitrile
A AKA A O NC.
S , negative

Courtesy of AKA A O NC.

Ordering Information for Unison UK-C8

3µm Columns, Pressure Limits of up to: 50MPa, 500 bar, 7,500 psi					
	ID				
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm
10			UK820T	UK830T	UK800T
20			UK829T	UK839T	UK809T
30	UK811T	UK871T	UK821T	UK831T	UK801T
50	UK812T	UK872T	UK822T	UK832T	UK802T
75	UK813T	UK873T	UK823T	UK833T	UK803T
100	UK814T	UK874T	UK824T	UK834T	UK804T
150	UK815T	UK875T	UK825T	UK835T	UK805T
250	UK816T	UK876T	UK826T	UK836T	UK806T

3µm: 100MPa,1000 bar, 15,000 psi	
Column Length	ID
	2.0 mm
10	
20	
30	UK821U
50	UK822U
75	UK823U
100	UK824U
150	UK825U
250	UK826U

3µm Columns, pressure limits of up to: 20MPa, 250 bar, 3,000 psi							
	Internal Diameter						
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
10			UK820	UK830	UK800		
20			UK829	UK839	UK809		
30	UK811	UK871	UK821	UK831	UK801	UK861	UK8P1
50	UK812	UK872	UK822	UK832	UK802	UK862	UK8P2
75	UK813	UK873	UK823	UK833	UK803	UK863	UK8P3
100	UK814	UK874	UK824	UK834	UK804	UK864	UK8P4
150	UK815	UK875	UK825	UK835	UK805	UK865	UK8P5
250	UK816	UK876	UK826	UK836	UK806	UK866	UK8P6
500					UK807		

Guard Column System for Unison UK-C8							
	Internal Diameter						
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M
Guard Cartridge (Set of 3)	GCUK8C	GCUK8C	GCUK8S	GCUK8S	GCUK8S	GCUK8S	GCUK8M

All of our stationary phase can also be made in the followingl internal diameters: Nano: 0.05mm, 0.075mm Capillary: 0.1mm, 0.3mm, 0.5mm Semi-Prep: 20mm, 28mm

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4. Via www.imtaktusa.com with any major credit card

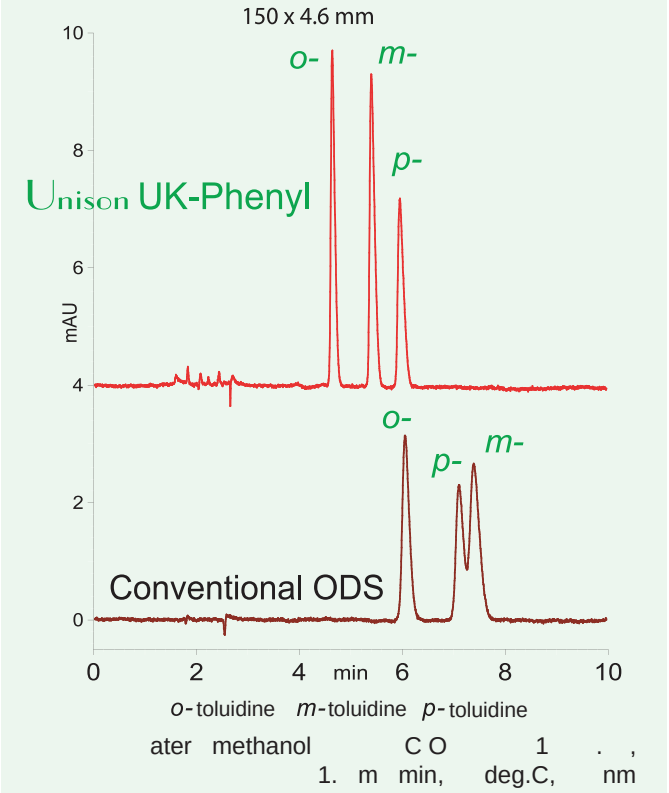
Imtakt USA

Unison UK-Phenyl

Polar to Non-Polar Compounds, Chelating Compounds

Distinct Selectivity from an ODS Column

- Pi-Pi interaction offer offer unique selectivity
- Better separation of m- and p- isomers than a conventional ODS
- Superior batch to batch reproducibility



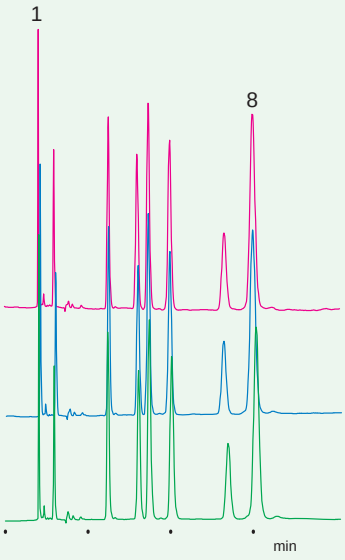
ater methanol C O 1 . ,
1. m min, deg.C, nm

he phenyl stationary phase separates compounds based on the interaction bet een the phenyl base bonding and pi electrons in the solute.

he chromatogram to the left compares ODS and UK- henyl results for toluidine, a regioisomer. he influence of the solute pi electron locali ation especially, p-isomers allo s an exceptional separation of m- and p- isomers by UK- henyl, something hich the ODS column could not accomplish.

Chemical compoud structures are becoming increasingly complex in today s chemistry and there are gro ing needs for separations by interactions other than hydrophobicity. hen ODS cannot ans er your separation problems, UK- henyl can play a productive role in opening ne possibilities in the orld of separation.

anufacturing atch to atch eproducibility



Unison UK- henyl, x . mm
m ammonium acetate ACN
1. m min, C, nm

1 1-hydroxy- -a aben otria ole

acetaminophen

prednisolone

-alpha-methylprednisolone

methyl -amino- -thiophenecarboxylate

corticosterone

-aminoben ophenone

8 propylparaben

he Unison series packing material is manufactured in a proprietary manner different from conventional methods. his development as completed to not only achieve high efficiency packing material but also to provide high levels of batch-to-batch reproducibility.

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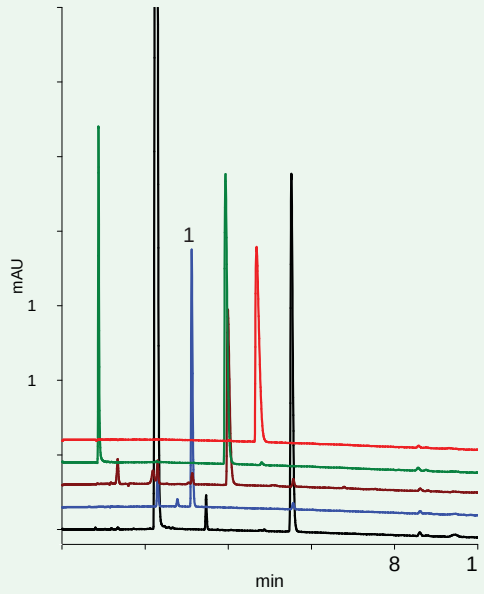
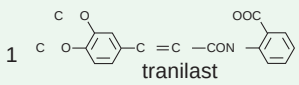
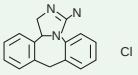
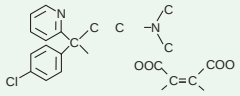
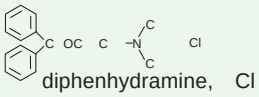
Allergy edications

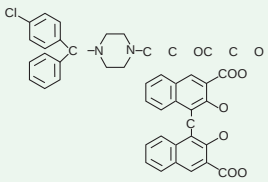



tranilast


epinastine, Cl


chlorpheniramine, malate


diphenhydramine, Cl


hydroxy ine, pamoic acid salt

Unison UK- henyl, x . mm
A m COON ACN
-8 -1 min
1. m min, C, . a, nm
. - u . -1 ug

Ordering Information for Unison UK- henyl

3µm Columns, Pressure limits of up to: 50MPa, 500 bar, 7,500 psi						3µm 100MPa,1000 bar, 15,000 psi	
	ID					Column Length	ID
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm		2.0 mm
10			UKP20T	UKP30T	UKP00T	10	
20			UKP29T	UKP39T	UKP09T	20	
30	UKP11T	UKP71T	UKP21T	UKP31T	UKP01T	30	UKP21U
50	UKP12T	UKP72T	UKP22T	UKP32T	UKP02T	50	UKP22U
75	UKP13T	UK 73T	UKP23T	UKP33T	UKP03T	75	UKP23U
100	UKP14T	UKP74T	UKP24T	UKP34T	UKP04T	100	UKP24U
150	UKP15T	UKP75T	UKP25T	UKP35T	UKP05T	150	UKP25U
250	UKP16T	UKP76T	UKP26T	UKP36T	UKP06T	250	UKP26U

3µm Columns, Pressure limits of up to: 20MPa, 250 bar, 3,000 psi							
	Internal Diameter						
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
10			UKP20	UKP30	UKP00		
20			UKP29	UKP39	UKP09		
30	UKP11	UKP71	UKP21	UKP31	UKP01	UKP61	UKPP1
50	UKP12	UKP72	UKP22	UKP32	UKP02	UKP62	UKPP2
75	UKP13	UKP73	UKP23	UKP33	UKP03	UKP63	UKPP3
100	UKP14	UKP74	UKP24	UKP34	UKP04	UKP64	UKPP4
150	UKP15	UKP75	UKP25	UKP35	UKP05	UKP65	UKPP5
250	UKP16	UKP76	UKP26	UKP36	UKP06	UKP66	UKPP6
500					UKP07		

Guard Column System for Unison UK-Phenyl							
	Internal Diameter						
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M
Guard Cartridge (Set of 3)	GCUKPC	GCUKPC	GCUKPS	GCUKPS	GCUKPS	GCUKPS	GCUKPM

All of our stationary phases can also be made in the following internal diameters: Nano: 0.05mm, 0.075mm Capillary: 0.1mm, 0.3mm, 0.5mm Semi-Prep: 20mm, 28mm

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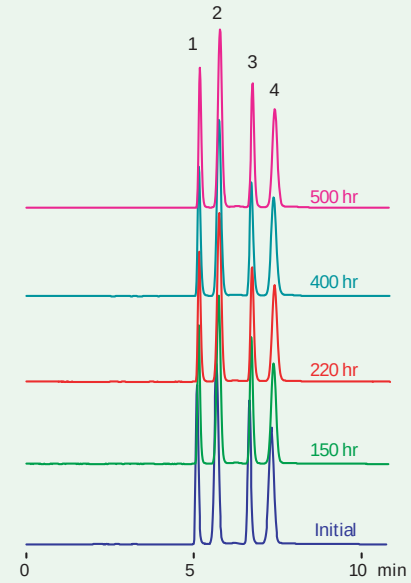
Imtakt USA

Unison UK-Amino

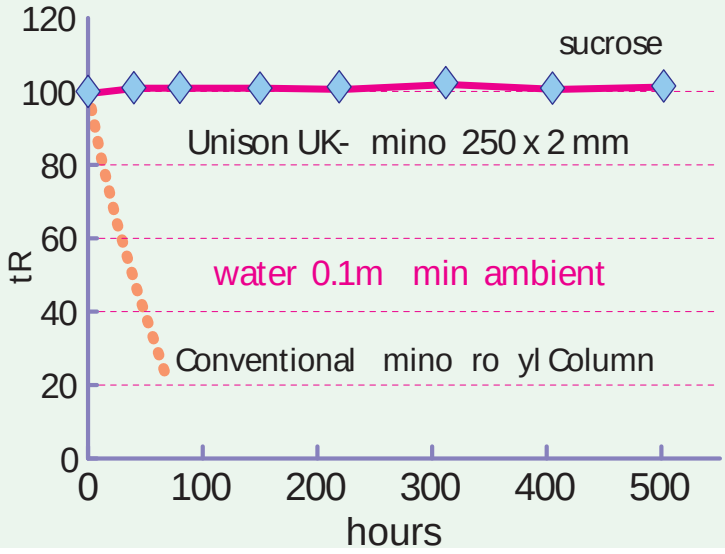
Unequalled durability against water elution

- evolutionary aqueous durability for aminopropyl phase
- Aqueous to non-aqueous Normal hase separation
- m particle high-speed and superior resolution
- C- S applicable
- ure spherical porous silica m particle Aminopropyl phase



1. fructose (2.5mg m)
2. glucose (3.75mg m)
3. sucrose (2.5mg m)
4. maltose (3.75mg m)

Unison UK- mino 250 x 2 mm
acetonitrile water 75 25
0.2m min (8 a)
37 deg.C 4u E



Aqueous durable silica-based aminopropyl columns have been used for a long time as a normal phase column for carbohydrate separation. o ever, these aminopropyl columns have a fatal fla column bleeding or the rapid deterioration in retention as a result of ligand desorption under aqueous elution.

Our ne ly-designed Unison UK-Amino offers a different approach from conventional columns high durability against aqueous eluent. As the above chromatogram demonstrates, conventional columns experience a significant decline in retention hen an aqueous mobile phase elutes through the column. UK-Amino, on the other hand, does not sho any change in separation or retention. his is a significant development in the history of aminopropyl columns.

UK-Amino s design not only provides analytical po er, but the um particle high-resolution column has other benefits, including the minimi ation of C- S and C- SD noise levels. UK-Amino can be applied to aqueous normal phase conditions, and separation optimi ation is possible hile comparing to ODS columns using reversed-phase mode. One can expect significant results from this normal phase column of UK-Amino.

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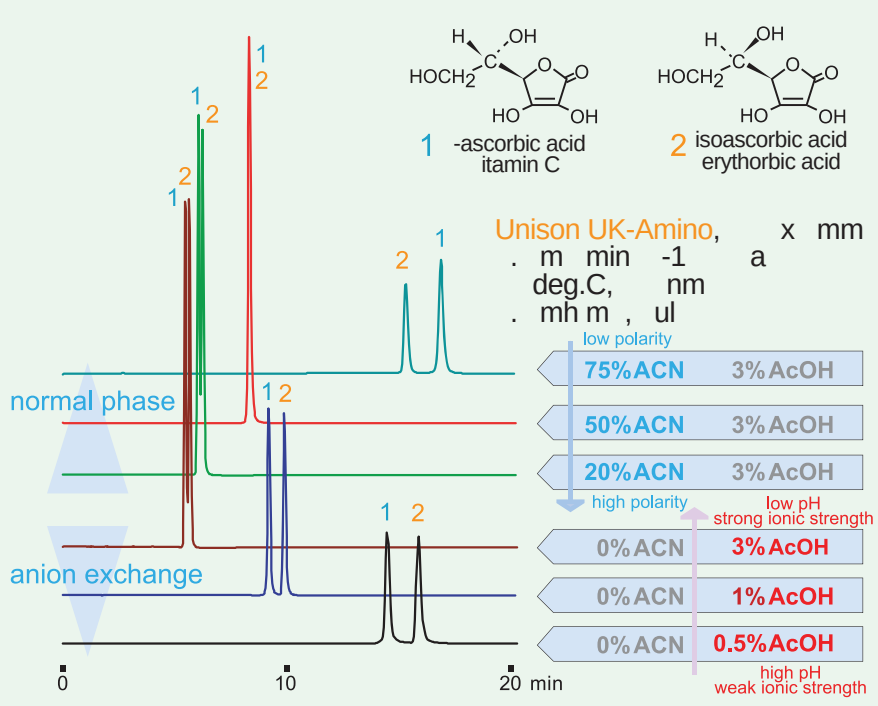
Normal Phase and Anion Exchange Modes

Aminopropyl stationary phases generally employ both a normal phase separation mode and an anion exchange mode derived from amino groups. here are t o methods using Unison UK-Amino to separate ascorbic acid and its isomer isoascorbic acid erythorbic acid .



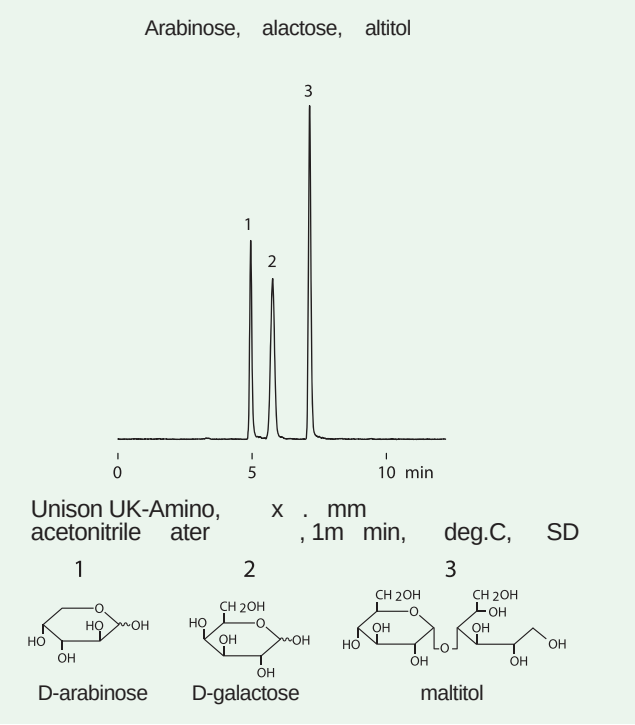
Normal phase + Anion exchange mode

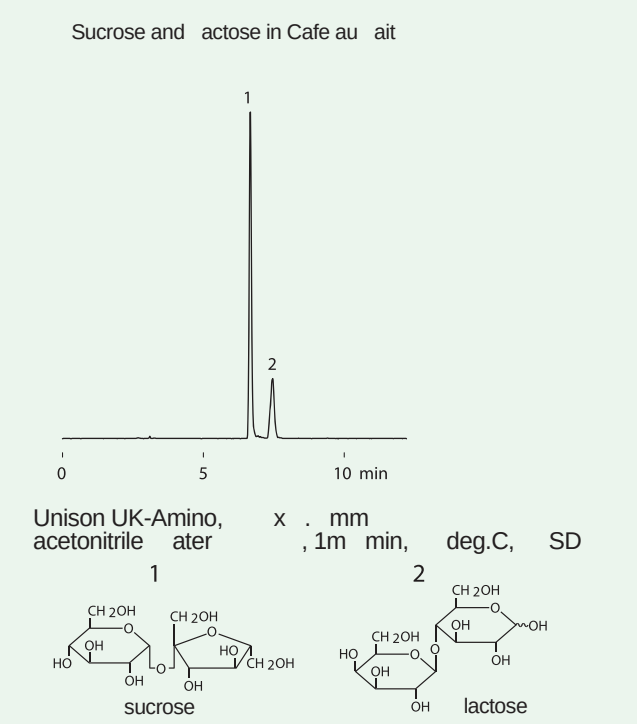
n the normal phase mode, retention deteriorates as the polarity in the mobile phase rises. o ever, as the acetonitrile partition rises, retention increases and the t o compounds completely separate at acetonitrile. oreover, the elution order is reversed from anion exchange mode due to the difference in interactions.

Anion Exchange Mode

n anion exchange mode, retention deteriorates as the ionic strength gro s larger and p -driven ionic interactions gro eaker in this case, high acidic density lo p . n this example, t o compounds are completely separated ith only a . acetic acid aqueous solution.

Normal Phase Separation of Saccharides





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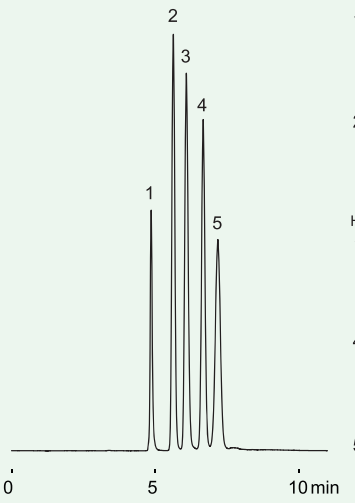
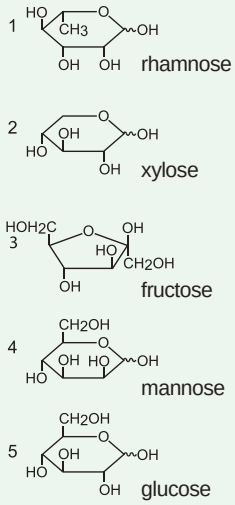
Normal Phase Separation of Saccharides

Unison UK-Amino provides excellent peak shape ith um particles for hydrophillic monosaccharides and sugar alcohols separation.

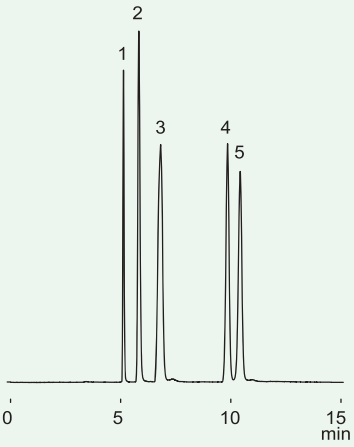
onosaccharides

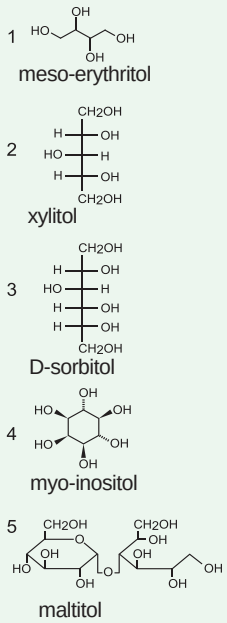




Unison UK-Amino, x mm
acetonitrile ater 8 , . m min,
deg.C, SD

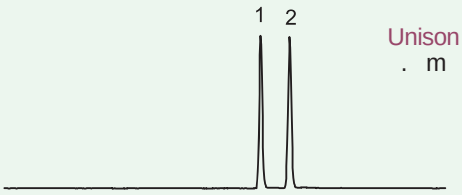
Sugar Alcohols



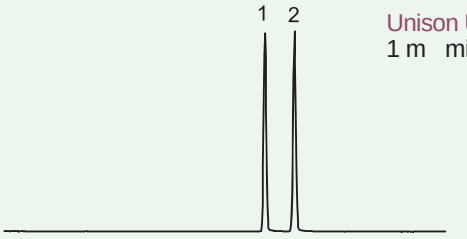


Unison UK-Amino, x mm
acetonitrile ater 8 , . m min,
deg.C, SD

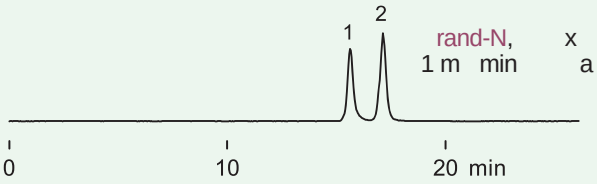
Sorbitol and Mannitol



Unison UK-Amino, x mm
. m min a , . ul . ug

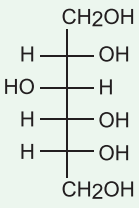


Unison UK-Amino, x . mm
1 m min a , 1. ul . ug



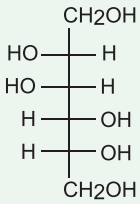
Sharp peak shape is possible
ith sugar alcohols by raising
the column temperature settings.

1



D-sorbitol

2



D-mannitol

acetonitrile ater 1
deg.C, SD

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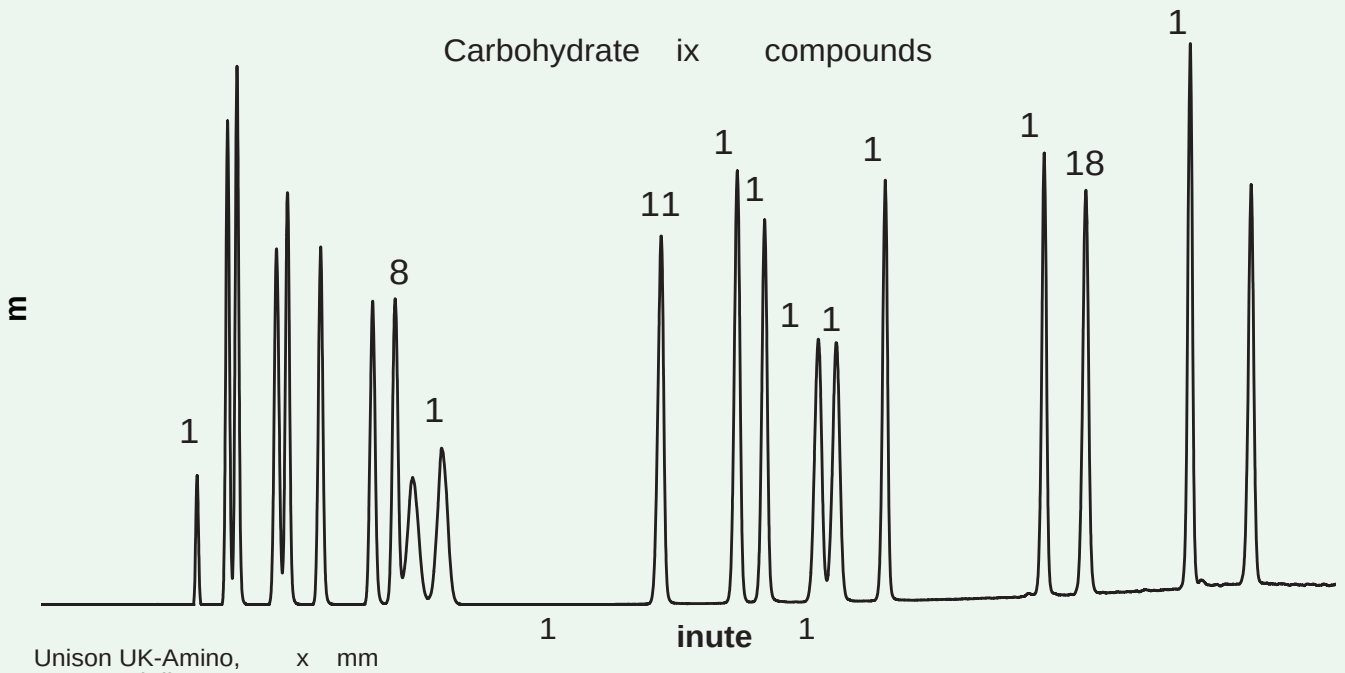
Simultaneous HPLC/LT-ELSD Analysis of Polyols, Mono-, Di- and Oligosaccharides



Unison UK-Amino, x mm
A acetonitrile
ater
1 - min
1 - - min
- min
. m min, C, u
SD S D , rance
S D , 8 C, . ar

Data provided by
Dr. ric
S D S.A.S., rance

	inutes		n es nse	n
er				
mn se				
r t rit				
r in se				
se				
ru t se				
r it				
nn se				
t se				
u se				

	inutes		n es nse	n
n sit				
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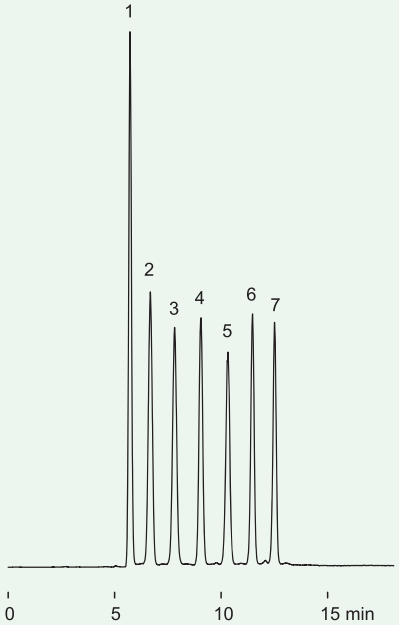
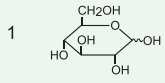
t se				
re se				
in se				
t tri se				
st se				
t tetr se				

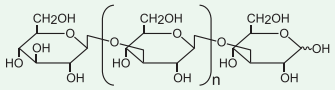
aminariorigosaccharides



Unison UK-Amino provides exceptional separation efficiency for oligosaccharides and other chemical compounds ith relatively high molecular eights.



glucose



2. laminaribiose (n=0)
3. laminaritriose (n=1)
4. laminaritetraose (n=2)
5. laminaripentaose (n=3)
6. laminarihexaose (n=4)
7. laminariheptaose (n=5)

Unison UK-Amino, x mm
A acetonitrile, ater, - -1 min
. m min, deg.C, SD

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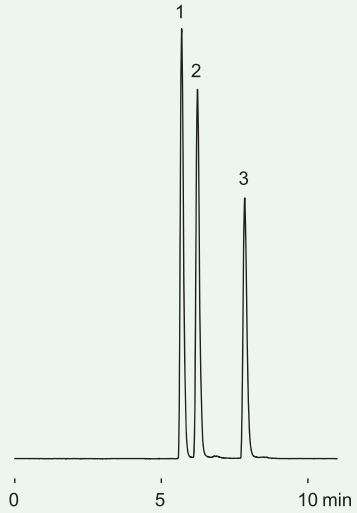
Aqueous Normal Phase Separation

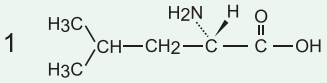
Unison UK-Amino can conduct aqueous normal phase separation even ith chemical compounds other than carbohydrates. he column can optimally handle various compounds ith its combination of electrostatic interactions and anion exchange mode. n that case, CU S, C- SD, and C- S is possible by optimi ing the organic solvent strength and type, and by ad usting the buffer p and ionic strength.

Branched-Chain Amino Acids

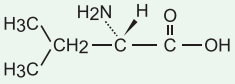
n amino acid separation ith both electrolytes, sharp peak shape is possible by controlling p and ion strength ith neutral acetate ammonium.



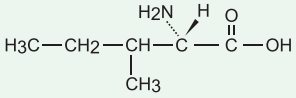
1 -leucine



3 -valine



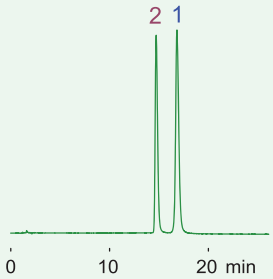
2 -isoleucine



Unison UK-Amino, 1 x mm
acetonitrile 1 m ammonium acetate 8 1
. m min, deg.C, SD

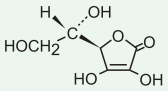
Ascorbic Acid and Erythorbic Acid

Ascorbic acid and its isomer erthyorbic acid can be separated in either normal phase or ion exchange modes. Unison UK-Amino can be used ith acetic acid, a mild p ad usting agent. oreover, separation mode differences allo column users to select different elution orders and separation modes to suit their needs.

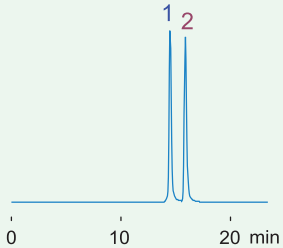


normal phase

Unison UK-Amino, 1 x mm
acetonitrile ater acetic acid 8
. m min a
deg.C, nm,
1u 1. ug

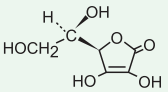


1 -ascorbic acid
vitamin C



anion exchange

Unison UK-Amino, x mm
ater acetonitrile 1 .
. m min 1 a
deg.C, nm,
. u . ug



2 isoascorbic acid
erythorbic acid

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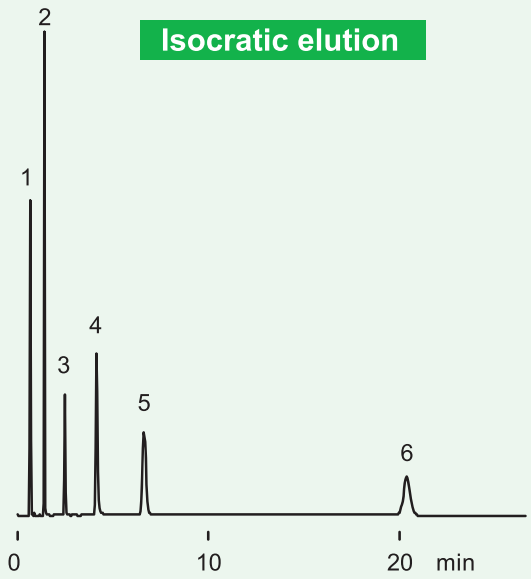
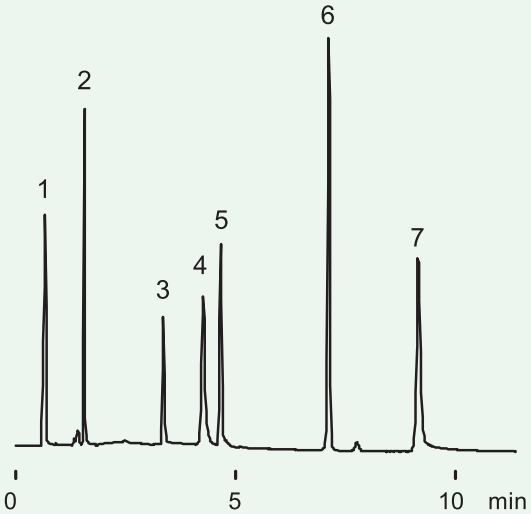
Aqueous Normal Phase Separation (Water-Soluble Vitamins)

ater-Soluble itamins



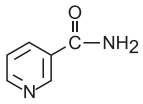
Unison UK-Amino, 1 x . mm
ACN ater acetic acid 1
1m min, deg.C, nm



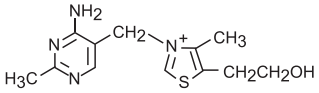
Unison UK-Amino, 1 x . mm
A ACN acetic acid 1
A ater acetic acid 1
- -1 min
1m min, deg.C, nm

Simple analysis is obtainable using acetic acid ith ater-soluble vitamins. here is no need for ion-pair mode via reversed-phase separation. oreover, gradient elution enables high speed analysis for a ide range of vitamins.

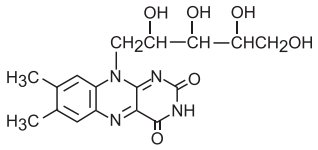
1 nicotinamide



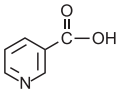
2 thiamine



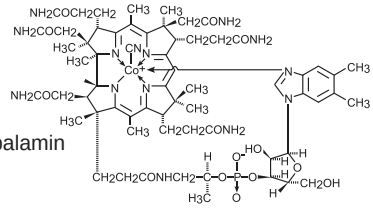
3 riboflavin



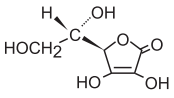
4 nicotinic acid



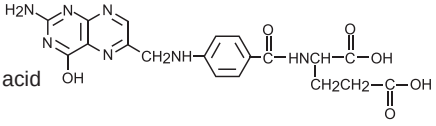
5 cyanocobalamin



6 -ascorbic acid



7 folic acid



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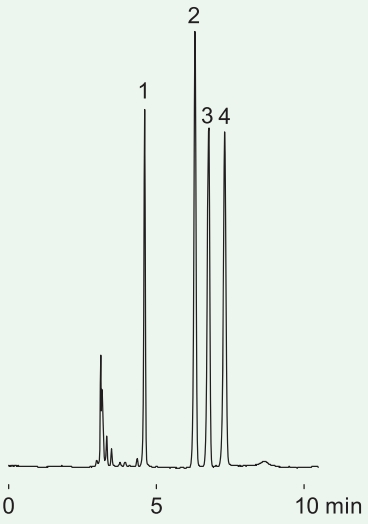
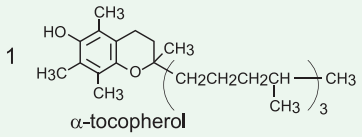
Non-Aqueous Normal Phase Separation

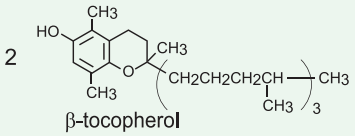
Unison UK-Amino has a highly polar stationary phase, hich enables non-aqueous normal phase separation similar to silica columns. o ever, the presence of a dissociative group amino group and bound ater in the stationary phase means that highly reproducible analysis is possible by adding acetic acid and other p modifiers.

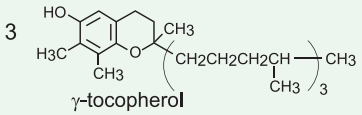
ocopherols

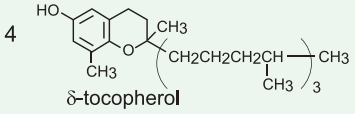


Unison UK-Amino, x . mm
hexane ethyl acetate acetic acid 8 .1
1 m min, deg.C, nm

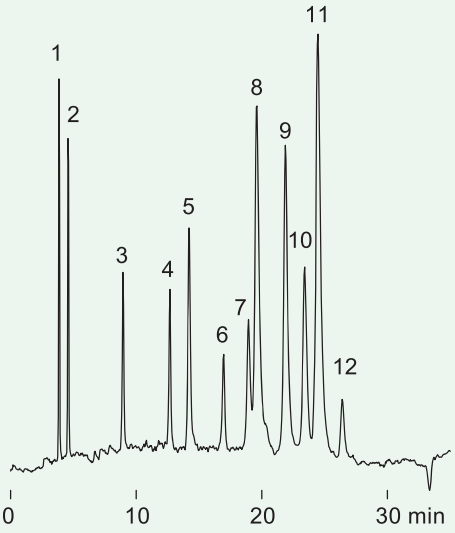




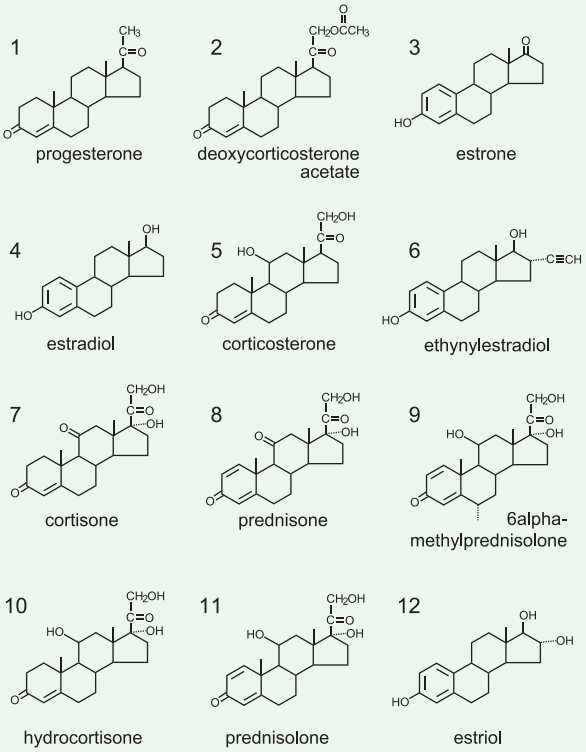




Steroids



Unison UK-Amino, x . mm
A hexane acetic acid 1 .1
ethanol acetic acid 1 1
1 - - min , 1 m min, deg.C, nm



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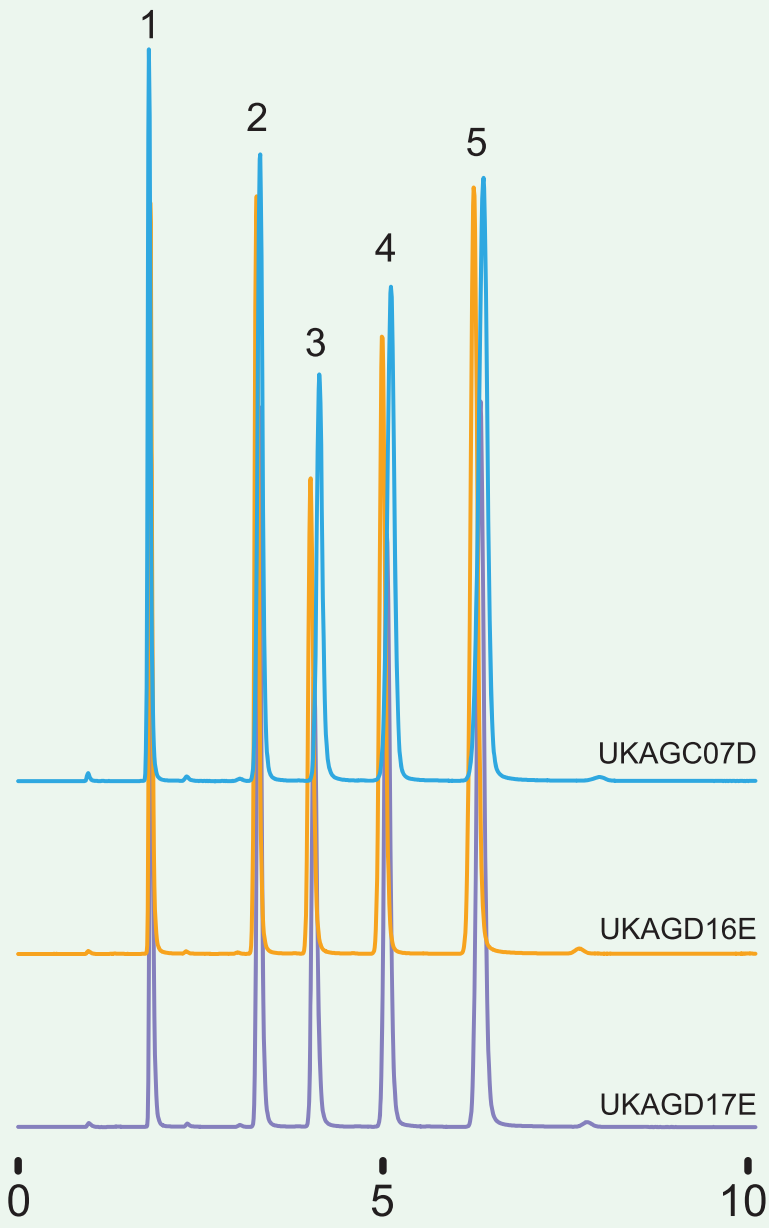
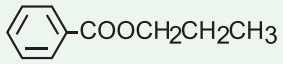
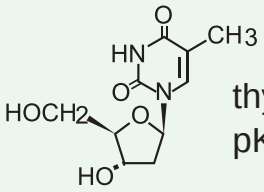
UK-Amino Batch-to-Batch Reproducibility

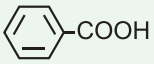


1 

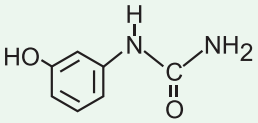
propylben oate

2 

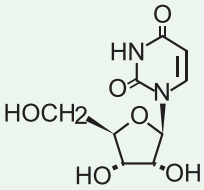
thymidine
pKa .8

3 

ben oic acid
pKa .

4 

-hydroxyphenylurea

5 

uridine
pKa .

Unison UK-Amino, 1 x mm
acetonitrile ater acetic acid
1
. m min . a
deg.C, nm

Conventional aminopropyl stationary phases struggle to achieve solute retention and repeatable separations becuase the interactions are complicated due to the presence of both normal phase and anion exchange modes. Unison UK-Amino addresses this problem ith a novel stationary phase design that provides excellent reproducibility.

Ordering Information for Unison UK- mino

3µm Columns, Pressure limits of up to: 50MPa, 500 bar, 7,500 psi					
	ID				
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm
10			UKA20T	UKA30T	UKA00T
20			UKA29T	UKA39T	UKA09T
30	UKA11T	UKA71T	UKA21T	UKA31T	UKA01T
50	UKA12T	UKA72T	UKA22T	UKA32T	UKA02T
75	UKA13T	UKA73T	UKA23T	UKA33T	UKA03T
100	UKA14T	UKA74T	UKA24T	UKA34T	UKA04T
150	UKA15T	UKA75T	UKA25T	UKA35T	UKA05T
250	UKA16T	UKA76T	UKA26T	UKA36T	UKA06T

3µm, 100MPa,1000 bar, 15,000 psi	
Column Length	ID
	2.0 mm
10	
20	
30	UKA21U
50	UKA22U
75	UKA23U
100	UKA24U
150	UKA25U
250	UKA26U

3µm Columns, Pressure limits of up to: 20MPa, 250 bar, 3,000 psi							
	Internal Diameter						
Column Length	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
10			UKA20	UKA30	UKA00		
20			UKA29	UKA39	UKA09		
30	UKA11	UKA71	UKA21	UKA31	UKA01	UKA61	UKAP1
50	UKA12	UKA72	UKA22	UKA32	UKA02	UKA62	UKAP2
75	UKA13	UKA73	UKA23	UKA33	UKA03	UKA63	UKAP3
100	UKA14	UKA74	UKA24	UKA34	UKA04	UKA64	UKAP4
150	UKA15	UKA75	UKA25	UKA35	UKA05	UKA65	UKAP5
250	UKA16	UKA76	UKA26	UKA36	UKA06	UKA66	UKAP6
500					UKA07		

Guard Column System for Unison UK-Amino							
	Internal Diameter						
	1.0 mm	1.5 mm	2.0 mm	3.0 mm	4.6 mm	6.0 mm	10.0 mm
Guard Holder	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH01S	GCH02M
Guard Cartridge (Set of 3)	GCUKAC	GCUKAC	GCUKAS	GCUKAS	GCUKAS	GCUKAS	GCUKAM

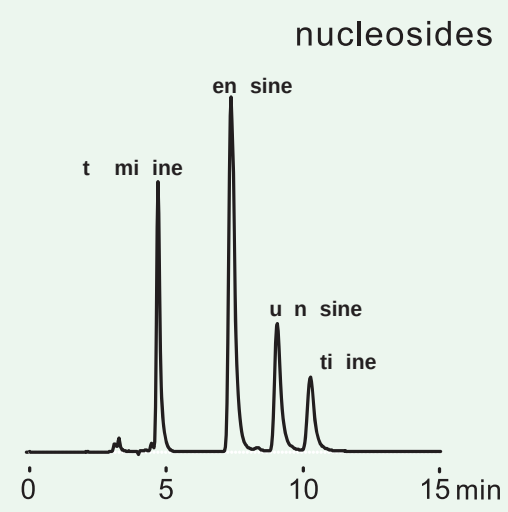
All of our stationary phases can also be made in the following internal diameters:
Nano: 0.05mm, 0.075mm Capillary: 0.1mm, 0.3mm, 0.5mm Semi-Prep: 20mm, 28mm

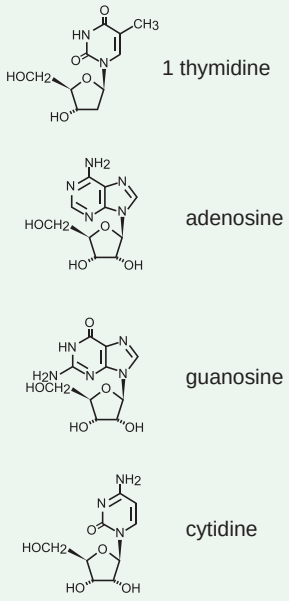
Four Easy Ways To Order:
1. Call us at (215) 665-8902
2. Order by fax (501) 646-3497
3. Through VWR (vendor code 8070779) or Fisher (vendor code VN101253)
4. Via www.imtaktusa.com with any major credit card

Unison UK-Silica

Aqueous to Non-aqueous, Normal Phase

Normal phase retention of polar compounds





Unison UK-Silica, x mm
acetonitrile m ammonium acetate 1
. m min, deg.C, mn

Unison has numerous stationary phases including C18, C8, phenyl, silica, and aminopropyl.

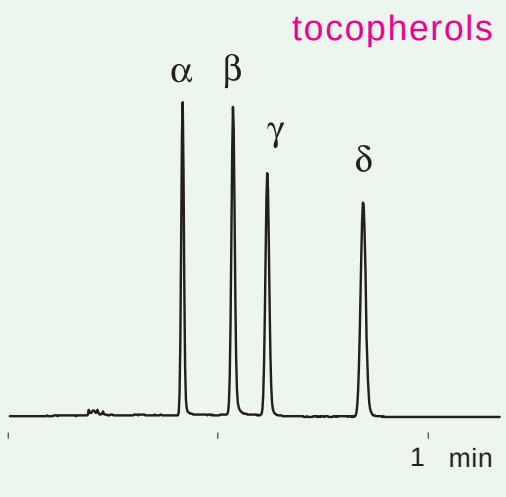
or normal phase separation, Unison offers silica and aminopropyl columns.

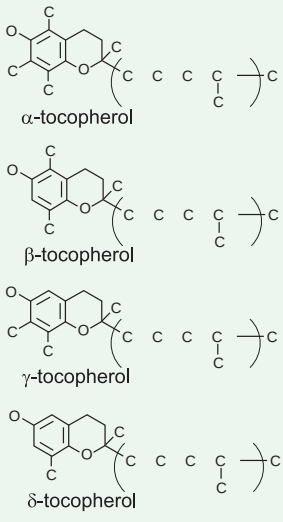
Offering dramatically higher resolution than conventional um columns, the Unison UK series provides authoritative normal phase separation ith silica stationary phase.

n addition to normal phase mode, Unison UK-Silica is optimal for the separation of high-polarity compounds under aqueous normal phase conditions.

he nuceotide separation example above provides a demonstration of Unison UK-Silica s po er. t sho s the separation of an eluent containing a high concentration of acetonitrile ith an aqueous solution of ammonium acetate added. n this manner, UK-Silica is excellent for C- S and the separation of highly polar compounds hen retention on a traditional ODS phase is poor.

mproved recognition for isomers





Unison UK-Silica, 1 x . mm
hexane
1. m min, C, nm

he Unison series of columns provides authoratative results in normal phase separation using its silica stationary phase. his high level of performance is in addition to its extraordinary resolution, higher than conventional um columns.

he example to the left sho s a normal phase separation of the tocopherol isomers. eta- and gamma- tocopherol are positional isomers, compounds characteri ed as difficult to separate. Unison UK-Silica 1 x . mm, ho ever, provides excellent separation in under 1 minutes. y using the um silica Unison column, you can improve your efficiency and analysis speed compared ith conventional um, cm columns.

he Unison UK-Silica offers optimal solutions for specialty research areas including natural chemistry and organic conbinatorial chemistry.

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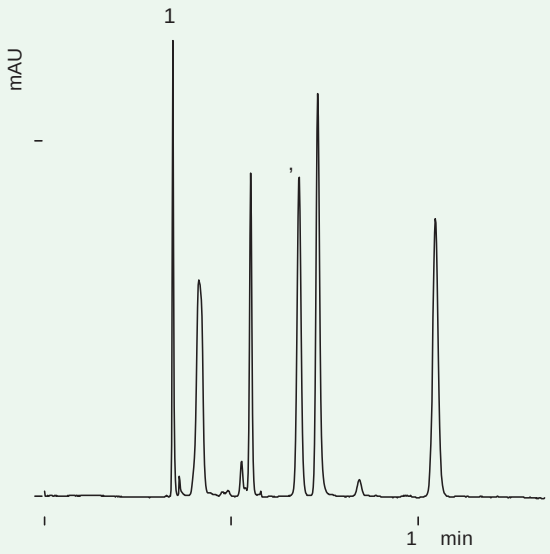
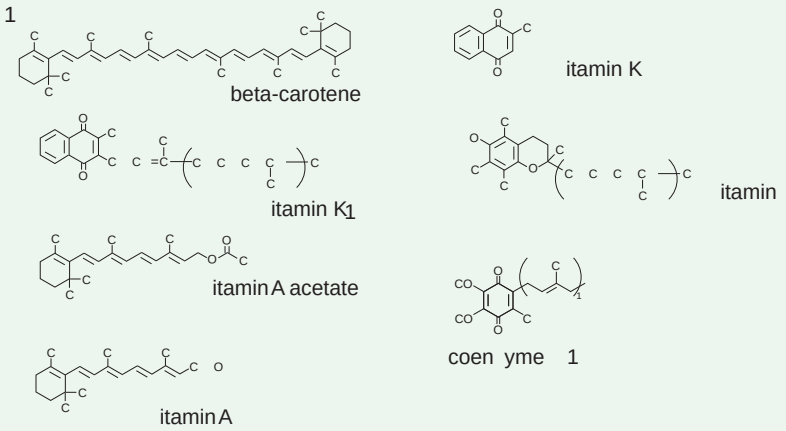
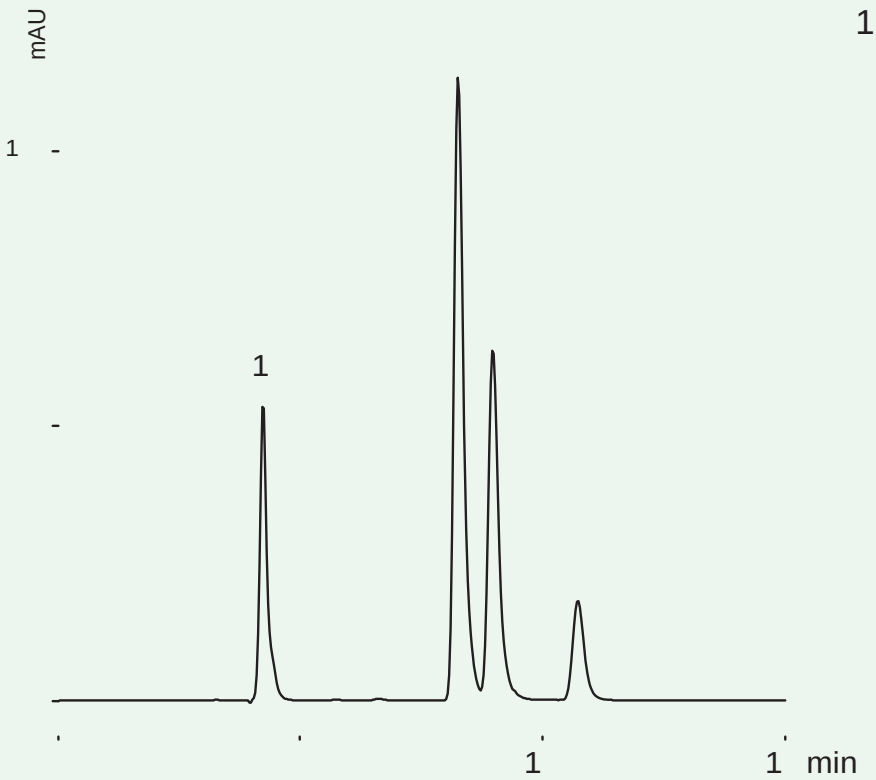
at soluble vitamins

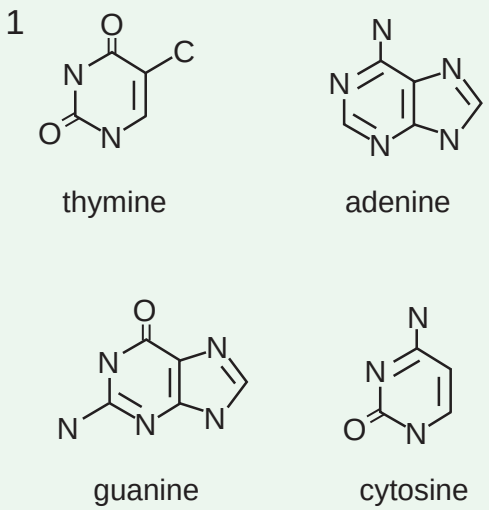




Unison UK-Silica, x . mm
hexane ethyl acetate tetrahydrofuran 1
1 m min, deg.C, 8 nm, u . - ug

Nucleic acid bases





Unison UK-Silica, x mm
acetonitrile m ammonium acetate 1
. m min . a , C, nm
. . - . 8 g

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