



TRACER EXCEL™ is a range of totally new packings that employ the most advanced procedures of synthesis and chemical functionalization, resulting in some column packings that completely surpass other silica-based packings on the market.

To manufacture the silica particle, the basis of all TRACER EXCEL packings, we begin with materials of extreme purity and follow strictly controlled processes. In this way, we get a totally porous, spherically perfect particle, without surface irregularities and with an extremely low content of metals (Al, Fe, Ti and Zn).

The rigorous control of the process variables also allows us to obtain a material with a perfectly reproducible porosity and surface area, and with a practical absence of micropores. In other competitors' packings, these micropores cause chromatographic problems due to incomplete substitution of the support, while with TRACER EXCEL packings micropores are totally eliminated.

We are therefore able to offer you a complete line of HPLC packings with characteristics of reproducibility, purity, deactivation, fluidodynamic behaviour and chemical and physical stability that are difficult to beat.

- Exceptional batch-to-batch reproducibility.
- Ultra-pure silica.
- Extremely low content of metals.
- Perfect sphericity.
- Meticulously controlled materials.
- Maximum pH range (between 1.5 and 11.0)
- 3, 5 and 10  $\mu\text{m}$  particles
- Easily scaled-up, from microbore to preparative HPLC.
- Available with 300Å pore size for biochromatography.
- Exceptional long lifetime.
- Wide range of packings.
- Fully deactivated after functional bonding.

## TRACER EXCEL ODS-A

TRACER EXCEL ODS-A is a totally endcapped packing, notable for its extreme level of deactivation. This minimizes undesirable interactions when chromatographing strongly acidic or basic analytes or chelating compounds.

Additionally TRACER EXCEL ODS-A columns show extraordinary resistance to extreme pH values, between 1.5 to 11.0.

## Maximum Stability

The chemical and structural stability of TRACER EXCEL columns leads to long useful lifetimes, even under extreme conditions where columns of most major manufacturers would suffer rapid degradation.

## Total de-activation

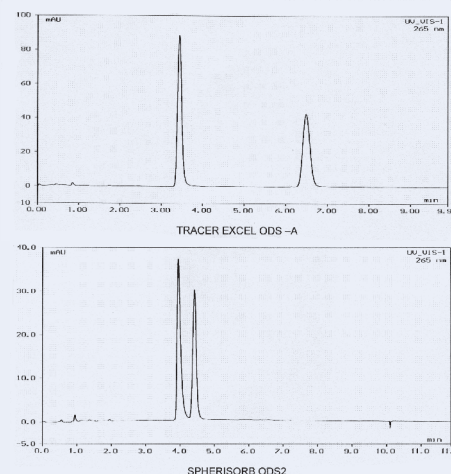
Free surface silanols that are left exposed following functional bonding of the silica particle are the chief cause of peak tailing and distortion that commonly appear with basic compounds.

If the silica particle also contains significant quantities of metals, these markedly increase the acidity of these surface silanols, keeping them ionized even at low pHs. These conditions can cause deleterious effects on eluting chromatographic peaks.

The Pyridine/Phenol test is an excellent marker of the presence of these surface silanols. Under ideal conditions, the pyridine peak should elute before the phenol peak and should also elute with total symmetry without tailing. Furthermore, a broader separation between the two peaks indicates superior deactivation.

The TRACER EXCEL ODS-A column complies with the pyridine/phenol test better than other columns from major manufacturers. This demonstrates the extraordinary deactivation achieved with TRACER EXCEL ODS-A columns. Another test that demonstrates the quality of TRACER EXCEL ODS-A columns is the acidic compounds test. This type of compound yields evidence of the presence of chelating centres or points of ionic interchange that may be present in the silica particle.

## Pyridine/Phenol test



### Conditions of test

Eluant : Acetonitrile/Water, 30/70 1ml/min  
Lambda: 265nm

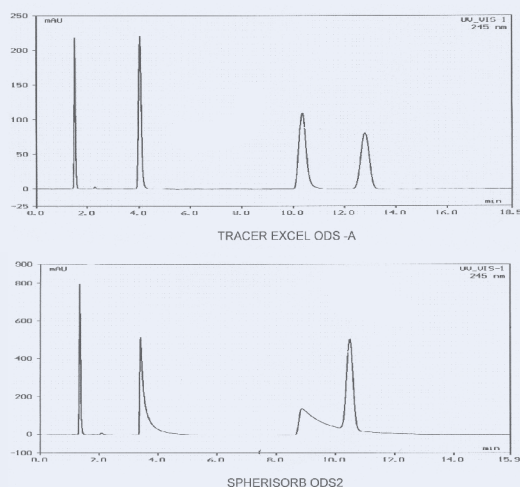
### Composition:

Pyridine 2.1 $\mu\text{l/ml}$   
Phenol: 14 mg/ml

TRACER EXCEL columns show perfectly symmetrical peaks in contrast to the significant tailing which appears when this test is done with other columns on the market. Symmetrical peaks are achieved even when separating basic compounds.

Once again, TRACER EXCEL columns show, thanks to their exceptional level of deactivation, excellence in obtaining perfectly symmetrical peaks where other columns on the market clearly fail (giving peaks with pronounced tails or even irreversible adsorption).

## Acid Compounds Test



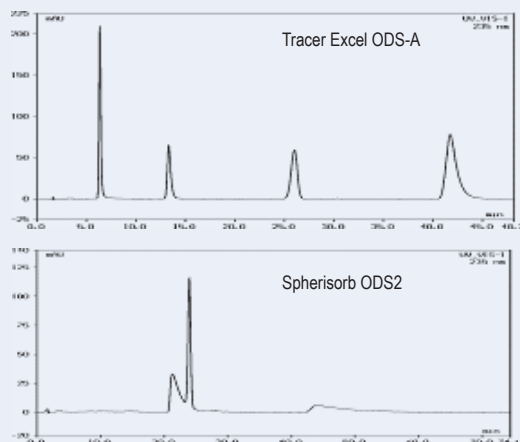
### Conditions of test

Eluant : 20 mM KH<sub>2</sub>PO<sub>4</sub>H<sub>3</sub>.2/CH<sub>3</sub>CN 65:35  
1 ml/min. Temp 40°C UV 245nm

### Composition:

Uracil: 0.5mg/ml  
Benzoic acid: 3.6 mg/ml  
p-Ethylbenzoic acid: 0.9 mg/ml  
Methylbenzene: 3.0 mg/ml

## Basic Compounds Test



### Conditions of test

Tracer Excel ODS-A  
Eluant : 20 mM KH<sub>2</sub>PO<sub>4</sub>H<sub>7</sub>/CH<sub>2</sub>CN 35:65  
1 ml/min. Temp 25°C UV 235nm

### Composition:

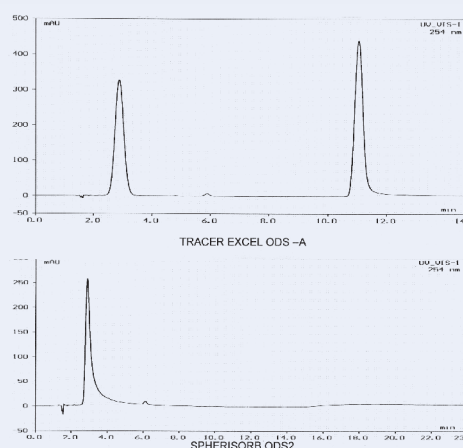
Propanolol: 0.08mg/ml  
Diphenidramine :1.28 mg/ml  
Acetonaphthalene: 0.2 mg/ml  
Amyltryptilene: 0.3 mg/ml

## Purity of material

All of the advantages of TRACER EXCEL columns have as a base the quality of the silica particle. No bonding process can mask silica of inferior quality. Only silica particles absolutely free of metallic impurities, with a pore-size and pore-distribution absolutely controlled and synthesized through fully optimized processes, can give bonded packings of the highest grade.

The 8-quinolinol/acetylacetone test demonstrates the difference in chromatographic behavior between TRACER EXCEL ODS-A and a competitor's column with a high content of metallic impurities for the chelating compound 8-quinolinol.

## Metalic Trace Test



### Conditions of test

Tracer Excel ODS-A  
Eluant : 10 mM KH<sub>2</sub>PO<sub>4</sub>H<sub>6</sub>.8/Metanol 60:40  
1 ml/min. Temp 30°C UV 254nm

### Composition:

8-Quinolinol: 0.5mg/ml  
Acetylacetone: 0.5mg/ml

## Reproducibility

The high productivity which is now needed in analytical and governmental laboratories oblige everyone to use reliable HPLC equipment and reproducible columns.

TRACER EXCEL columns were developed with the final objective of achieving the very highest quality and reproducibility. Teknokroma's numerous and stringent process controls for every batch of packing fully guarantees high quality and exceptional reproducibility.

# Tk Tracer Excel ODS-B

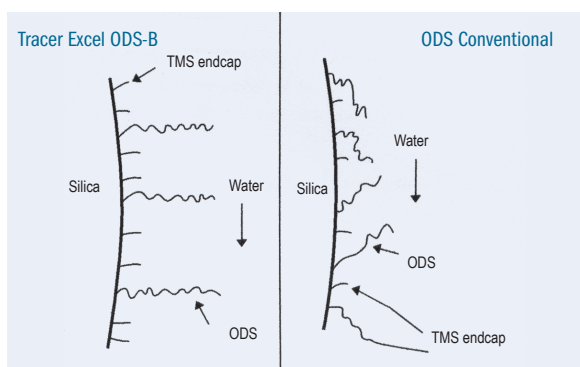
## TRACER EXCEL ODS-B

- Compatible with 100% aqueous eluant.
- Especially suitable for the separation of hydrophilic compounds.
- Strong retention in aqueous eluants.
- Long useful life with aqueous eluants
- Selectivity complementary to TRACER EXCEL ODS-A
- High mechanical stability
- Maximum versatility.

Based on the same principles as the TRACER EXCEL ODS-A columns, the TRACER EXCEL ODS-B column presents a high selectivity for hydrophilic and polar compounds, which are poorly retained on conventional ODS columns.

A special modification in the process of functionalizing the pure silica particle prevents the collapsing effect of the C18 chains when working with mainly aqueous eluants. So you can work with excellent chromatographic performance even when the percentage of the aqueous phase is 100%.

## EFFECT OF AQUEOUS ELUTANTS ON THE ORGANIZATION OF HYDROCARBON CHAINS.

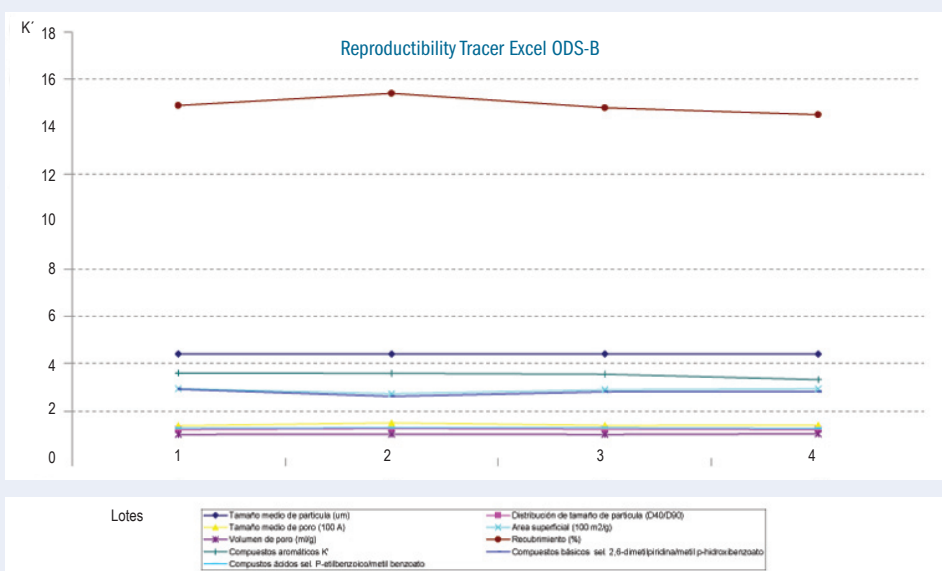
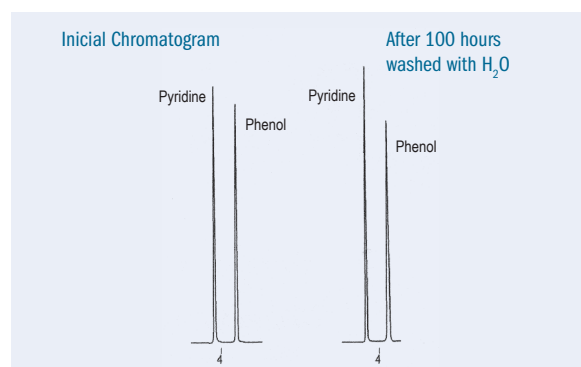


Generally, its field of application is the same as that of the TRACER EXCEL ODS-A, but its field of application is extended for samples which are especially difficult for conventional reversed phases, as is the case in separating oligosaccharides, amino acids, nucleotides and organic acids.

The special chromatographic conditions of TRACER EXCEL ODS-B also provide a specific selectivity for compounds which contain slightly polar groups in their structure.

This column is especially recommended for LC-MS in that, in many cases, the use of plugs or ionic blocking agents are avoided, which negatively affect detection when this technique is used.

As shown in the chromatogram, after more than 100 hours of operations with water no alteration is observed in retention times, selectivity or distortion in the peaks of pyridine and phenol - a clear indication that no collapse of the bonded phase functionality is adversely achieved with TRACER EXCEL ODS-B columns. Interestingly, the collapsing of bonded phase functionality with the majority of reversed phase columns on the market is typical under these conditions.



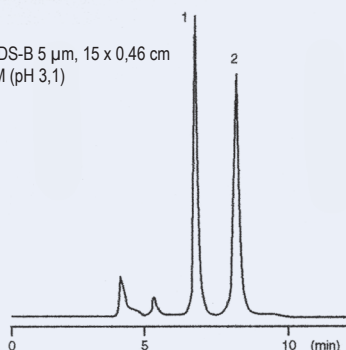


# Tracer Excel ODS-B **Tk**

## Antioxidants

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0,46 cm  
Eluant: Phosphate Plug 0,1 M (pH 3,1)  
Flow: 0,6 ml/min.  
Detector: ECD

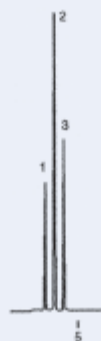
Sample: 1 Ascorbic Acid  
2 GSH



## Water Soluble Vitamins

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0,46 cm  
Eluant: Phosphate Plug 20 mM (pH 7,0)CH<sub>3</sub>CN 95/5 cm  
Flow: 0.6 ml/min.  
Detector: UV 210 nm

Sample: 1 Calcium Pantothenate  
2 Pyridoxine hydrochloride (B<sub>6</sub>)  
3 Nicotinamide



## Glycolic Acid and Lactic Acid

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0.46 cm  
Eluant: H<sub>3</sub>PO<sub>4</sub> 0.1%  
Flow: 0.6 ml/min.  
Temperature: 40°C  
Detector: UV 210 nm

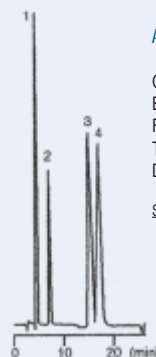
Sample: 1 Glycolic Acid  
2 Lactic Acid



## Alcohols

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0,46 cm  
Eluant: H<sub>2</sub>O  
Flow: 0,6 ml/min.  
Temperature: 40°C  
Detector: RID

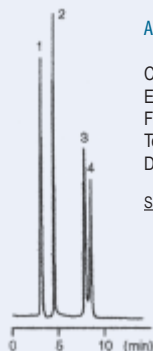
Sample: 1 Methanol  
2 Ethanol  
3 Iso-Propanol  
4 n-propanol



## Aminoacids

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0.46 cm  
Eluant: H<sub>2</sub>O  
Flow: 0.6 ml/min.  
Temperature: 40°C  
Detector: RID

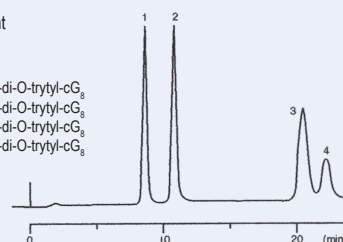
Sample: 1 Alanine  
2 Valine  
3 Isoleucine  
4 Leucine



## Cyclodextrin derivatives

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0.46 cm  
Eluant: MeOH/H<sub>2</sub>O 70:30  
Flow: 0.6 ml/min.  
Temperature: ambient  
Detector: UV240 nm

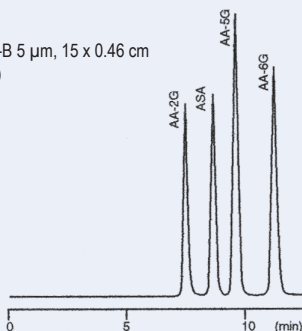
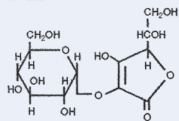
Sample: 1 6', 6''-di-O-trytyl-cG<sub>6</sub>  
2 6', 6''-di-O-trytyl-cG<sub>5</sub>  
3 6', 6''-di-O-trytyl-cG<sub>4</sub>  
4 6', 6''-di-O-trytyl-cG<sub>3</sub>



## Ascorbic Acid and Glycosides

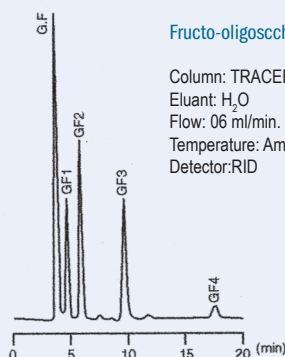
Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0.46 cm  
Eluant: Phosphate Plug (pH 3,8)  
Flow: 04 ml/min.  
Temperature: Ambient  
Detector: UV240 nm

AA-2G



## Fructo-oligosaccharides

Column: TRACER EXCEL ODS-B 5  $\mu$ m, 15 x 0,46 cm  
Eluant: H<sub>2</sub>O  
Flow: 06 ml/min.  
Temperature: Ambient  
Detector: RID



# Tk Other Tracer Excel Packings

The extraordinary qualities of TRACER EXCEL packings have been extended to a full range of operations, covering practically all the chromatographer's needs.

Si	Material of the ultrapure silica particle, the basis of all the TRACER EXCEL range.
C8	<p>This packing, made operative with octyl groups and totally endcapped, is extremely versatile.</p> <p>Its use is recommended for highly hydrophobic samples, which are retained excessively on ODS type packings.</p> <p>Developed on the same ultrapure silica as ODS-A and ODS-B, it is extremely reproducible and reliable.</p>
C4	<p>The same ultra pure silica of all the TRACER EXCEL range made operative with butyl groups, giving a moderately hydrophobic packing.</p> <p>Its principle field of application is the separation of peptides and proteins by reverse phase.</p> <p>In this case, the same packing is used with a 300 Å porosity, more suitable for the large size of protein molecules.</p> <p>Another field where this packing can be highly recommended is when the sample contains compounds of a very different hydrophobic nature.</p> <p>This packing permits perfect separation of a sample with a single injection.</p>
C1	<p>The same ultrapure silica of the TRACER EXCEL range is given its special function with tri-methylchlorosilane to create a low hydrophobic reversed phase.</p> <p>Its field of application includes the separation of peptides and proteins by reversed phase.</p> <p>It can also be used as a packing for normal phase with highly polar compounds.</p>
CN	<p>The type CN packings are much appreciated as alternatives to ODS-type packings for their special selectivity, as well as for the possibility they offer for working in both chromatographic modes, normal and reverse phase. However, in comparison with the latter, they have always been characterised by a lesser reproducibility and a notably shorter useful life.</p> <p>Thanks to the extraordinary level of quality of the silica of the particle and the optimization reached by the actuating processes, the new packing TRACER EXCEL 120 CN has satisfactorily overcome these limitations, so giving the chromatographer a completely reliable alternative.</p> <p>As a normal phase it is an excellent alternative to unsubstituted silica, given that retention times are much more reproducible, equilibration times much more rapid, and it does not suffer the problems of de-activation of silica itself.</p>
NH <sub>2</sub>	<p>This packing, with chemically bonded groups of aminopropyl silane, can be used as a phase normal or reverse phase packing depending on the eluant used.</p> <p>It is recommended for separations of basic compounds under normal phase conditions.</p> <p>Additionally, the reactivity of the amino group makes it very suitable as a support for later modifications as for example in the synthesis of quiral phases.</p> <p>It is also very suitable for SFC applications</p>
Ph	In the same way as the CN type packing, the packing substituted with dimethyl phenyl can be used in normal or reversed phase, being in this latter case a very useful alternative to ODS type packings since its aromatic groups give it a special selectivity when polar compounds are being chromatographed.
300 Angstrom	A complete range of packings with a pore diameter of 300 Angstrom units is available, ideal for undertaking separations of complex molecules of very high molecular weight, e.g. proteins and peptides.



# General Properties of Tracer Excel Packings **Tk**

	ODS-A	ODS-B	C8	C4	C1	CN	Ph	NH <sub>2</sub>	SI
<b>Size of pore in A units</b>	120	120	120	120	120	120	120	120	120
<b>Size of particle</b>	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm	3, 5 and 10 µm
<b>Volume of pores in ml/g</b>	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g	1.0 ml/g
<b>Surface area</b>	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g	300 m <sup>2</sup> /g
<b>Purity of silica</b>	Ultrapure	Ultrapure	Ultrapure	Ultrapure	Ultrapure	Ultrapure	Ultrapure	Ultrapure	Ultrapure
<b>%C</b>	17%	15%	10%	8%	5%	7%	9%	4%	
<b>Type of phase</b>	Monofunctional and totally endcapped	Monofunctional and totally endcapped	Monofunctional and totally endcapped	Monofunctional and totally endcapped	Monofunctional	Monofunctional and totally endcapped		Trifunctional	
<b>Metallic impurities (Al, Fe, Ti, Zr)</b>	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one	Less than 10ppm of each one

