ChromSpher® HPLC Columns

Workhorse column for reversed phase chromatography

- Narrow particle diameter range delivers unsurpassed efficiency
- Guaranteed repeatable selectivity for application-specific columns
- High carbon loading delivers excellent peak shape

Varian's ChromSpher column line offers several different reversed phase materials that offer unique selectivity, and an unbonded silica column for normal phase chromatography. ChromSpher material is available in both 3 and 5 µm particle sizes. We limit the particle diameter range so our columns exhibit efficiencies that are unsurpassed by any columns on the market.

ChromSpher material also serves as a basis for many of Varian's application-specific columns. Thes columns are tested with compounds used in particular analyses so that selectivity optimized for that application is repeatable and guaranteed.

These application-specific columns show the same high efficiencies as the more general ChromSpher line. The only difference is that application-specific columns are quality controlled using compounds associated with a particular application. For instance, with the ChromSpher PAH column, PAH compounds are used to verify repeatable retention and selectivity factors from column to column.

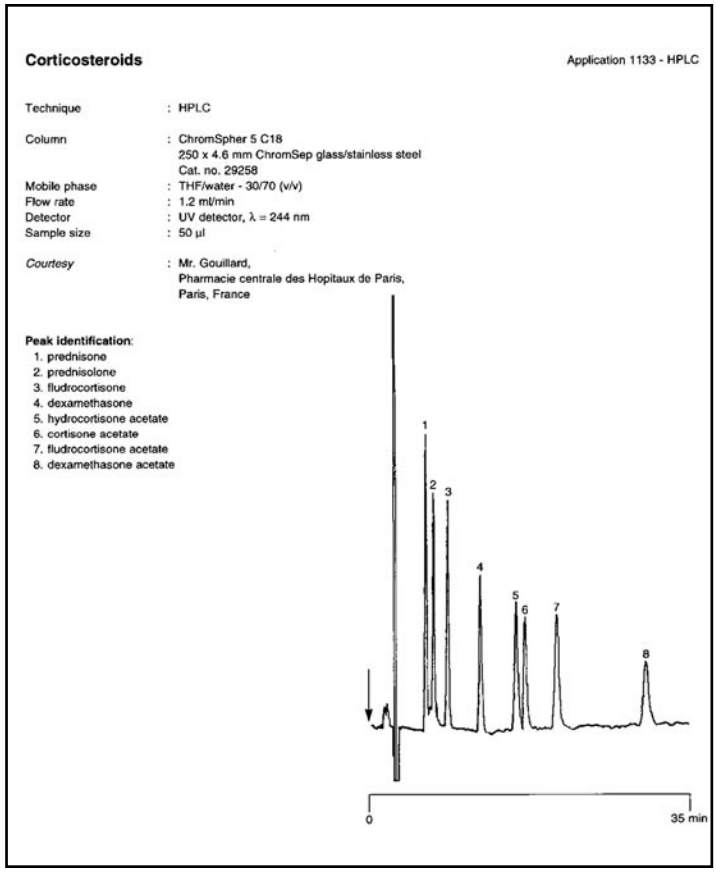
High carbon loading is achieved in the ChromSpher line by using a tri-chloro C-18 silane in the bonding process instead of the more traditional mono-chloro group. This ensures extensive cross-linking between the silanes, resulting in high surface coverage with the C18 moiety. This lowers peak tailing by masking residual surface silanols and thereby reducing secondary stationary phase interactions. The benefit is excellent peak shape, even with compounds containing highly polar functional groups, combined with high efficiency. This means you can use shorter columns for the analysis, thus saving time, solvents, and lowering detection limits.

ChromSpher® C18

- Analyzes a wide variety of compounds
- Available in 3 and 5 um particle sizes
- ChromSep stainless steel cartridge, or conventional column format
- USP Phase L1

ChromSpher C18 is an octadecylsilane-covered (ODS) spherical silica, non-endcapped phase that features high carbon loading, and is available in particle sizes of 3 and 5 µm. The bonded phase is stable over a pH range of 2.5 to 7.5. The ChromSpher C18 phase is an excellent choice for use as a general-purpose reversed phase column.

Typical compounds analyzed with ChromSpher C18 include:
acids, additives, aldehydes, alkaloids, amino acids, analgesics, antibacterials, antimicrobials, barbiturates, benzodiazepines, beverages, cardenolides, catecholamines, coronary vasodilators, corticosteroids, diuretics, drugs, fatty acids, flavors and aromas, glycols, phthalate esters, organic acids, pesticides, phenols in water, steroids, sulfonamides, toxins, tranquilizers and vitamins.



ChromSpher C18 Conventional Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	3 µm	5 µm
2	10	**CP28541**	
	15		**CP28423**
	25		**CP28531**
4.6	15		**CP28511**
	25		**CP28513**
10	25		**CP28514**

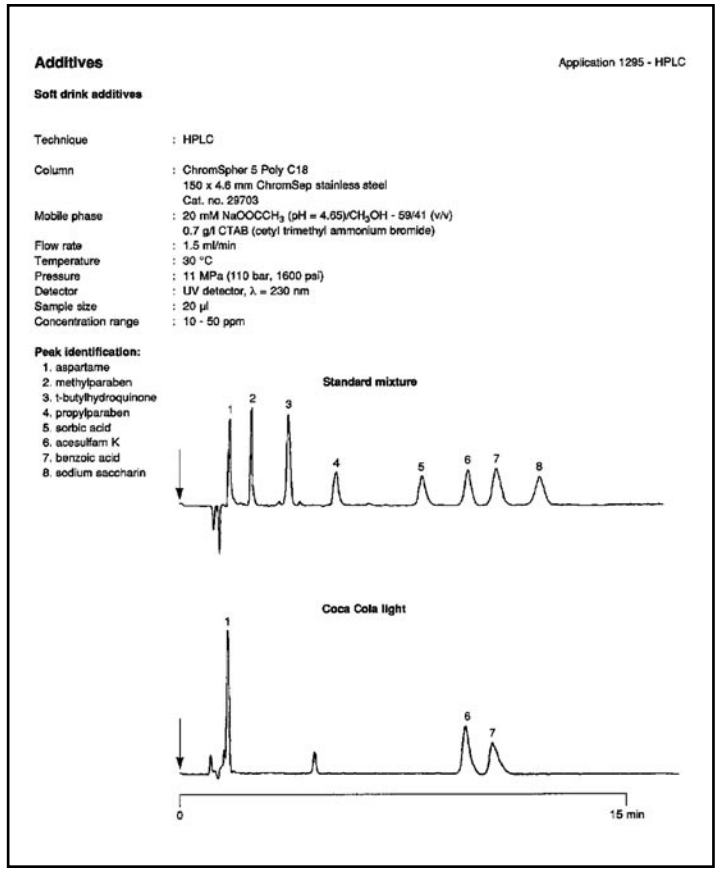
ChromSpher C18 ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 3 µm	Complete System 5 µm	Replacement	Replacement 3/Pk	Guard
3	5		**CP29210**	**CP29310**	**CP29410**	**CP28141**
	15		**CP29744**	**CP29844**	**CP29944**	**CP28141**
	25		**CP29745**	**CP29845**	**CP29945**	**CP28141**
4.6	5	**CP29219**		**CP29319**	**CP29419**	**CP28141**
	10	**CP29220**		**CP29320**	**CP29420**	**CP28141**
			CP29256	**CP29356**	**CP29456**	**CP28151**
	15		**CP29257**	**CP29357**	**CP29457**	**CP28151**
	25		**CP29258**	**CP29358**	**CP29458**	**CP28151**

ChromSpher® Poly C18

- Polymeric octadecylsilane-encapsulated (ODS) spherical silica with a 5 µm particle size
- Guaranteed superior reproducibility for selectivity and retention times
- Chemical and mechanical stable for guaranteed long column lifetime
- Fast analysis of wide polarity range compounds, without the use of gradient analysis
- ChromSpher Poly C18 replaces short alkyl chain phases: C1, C2 and TMS (trimethylsilane) and polar bonded phases: APS (aminopropylsilane)
- Perfect choice for profiling of low concentrations of impurities
- High inertness allows even the analyses of basic components
- Fast analyses of wide polarity range compounds, without the use of gradient analyses
- pH range: 2.0 - 8.0



ChromSpher Poly C18 is a polymeric octadecylsilane-encapsulated (ODS) spherical silica with a particle size of 5 µm. The unique bonding used in this phase makes it a potential replacement for short alkyl chain phases such as C1, C2 and TMS (trimethylsilane) as well as polar bonded phases such as APS (aminopropylsilane). This column is stable over a pH range of 2.0 to 8.0.

A challenge often faced in reversed phase liquid chromatographic analysis is the separation of compounds with a wide polarity range. Generally mixtures of this type require gradients to elute all components. However, gradient analysis increases the time required and reduces lab throughput.

When analyzing samples with a wide polarity range, the unique selectivity of the ChromSpher Poly C18 often allows fast analyses of wide polarity range samples, without the use of gradients.

Compounds typically analyzed with ChromSpher Poly C18 include: additives, antidepressants, aromatics, benzodiazepines, beverages, drugs, esters, impurities and polymers.

ChromSpher Poly C18 ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 5 µm	Replacement	Replacement 3/Pk
4.6	15	**CP29703**	**CP29704**	**CP29705**
	25	**CP29713**	**CP29714**	**CP29715**

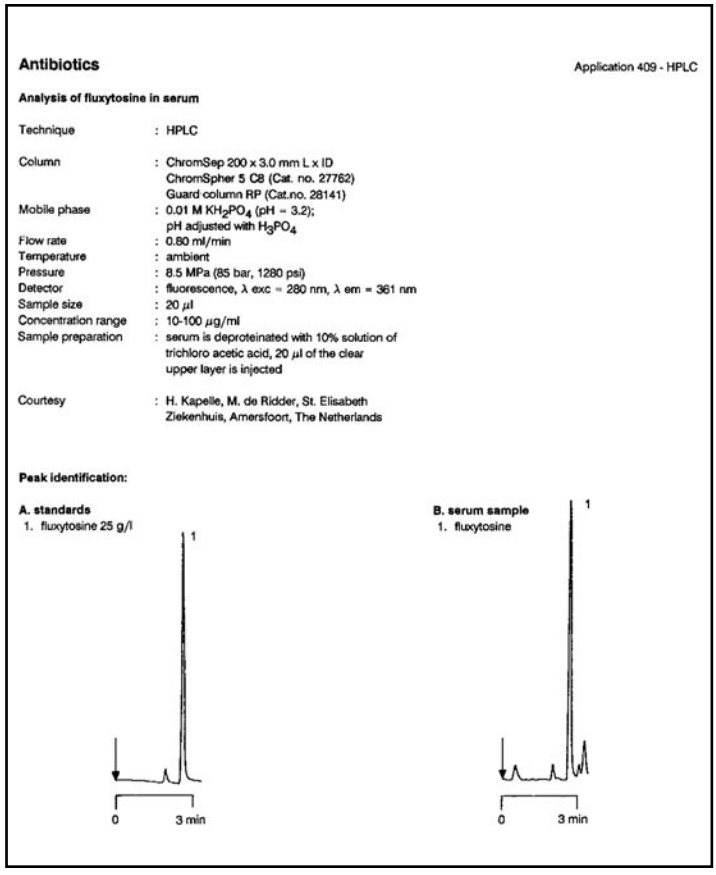
ChromSpher® C8

- Analyses a wide variety of compounds.
- Less retentive than C18 ODS columns
- USP Phase L7

ChromSpher C8 is an octylsilane-covered spherical silica with a particle size of 5 µm.

ChromSpher C8 is less retentive than ChromSpher C18, and is appropriate for a wide range of compounds from very polar to nonpolar. HPLC columns packed with ChromSpher C8 typically exhibit improved resolution over ChromSpher C18 for samples of moderate polarity because of selectivity differences. ChromSpher C8 can also be used effectively with ion-pair reagents for highly polar compounds that are not well retained under typical reversed phase conditions.

Compounds typically analyzed with ChromSpher C8 include: amino acids, analgesics, antiarrhythmics, antibiotics, anticonvulsant drugs, benzodiazepines, cardiovascular compounds, drugs, and herbicides.



ChromSpher C8 Conventional Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	5 µm
2	25	**CP28530**
4.6	15	**CP28501**
	25	**CP28503**

ChromSpher C8 ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 5 µm	Replacement	Replacement 3/Pk	Guard
3	15	**CP29742**	**CP29842**	**CP29942**	**CP28141**
	25	**CP29743**	**CP29843**	**CP29943**	**CP28141**
4.6	10	**CP29253**	**CP29353**	**CP29453**	**CP28151**
	15	**CP29254**	**CP29354**	**CP29454**	**CP28151**
	25	**CP29255**	**CP29355**	**CP29455**	**CP28151**

ChromSpher® Si

- Analyze pharmaceutical and other compounds
- Available in 3 and 5 um particle sizes
- ChromSep cartridge or conventional column format
- USP Phase L3

ChromSpher Si is a spherical silica that is available in both 3 and 5 µm particle sizes. It is designed to provide superior separations for HPLC applications run in the normal phase mode. It is used for nonpolar components that are soluble in organic solvents such as n-hexane. When analyzing complex mixtures, a silica column is recommended as the confirmation column.

ChromSpher Si Conventional Columns

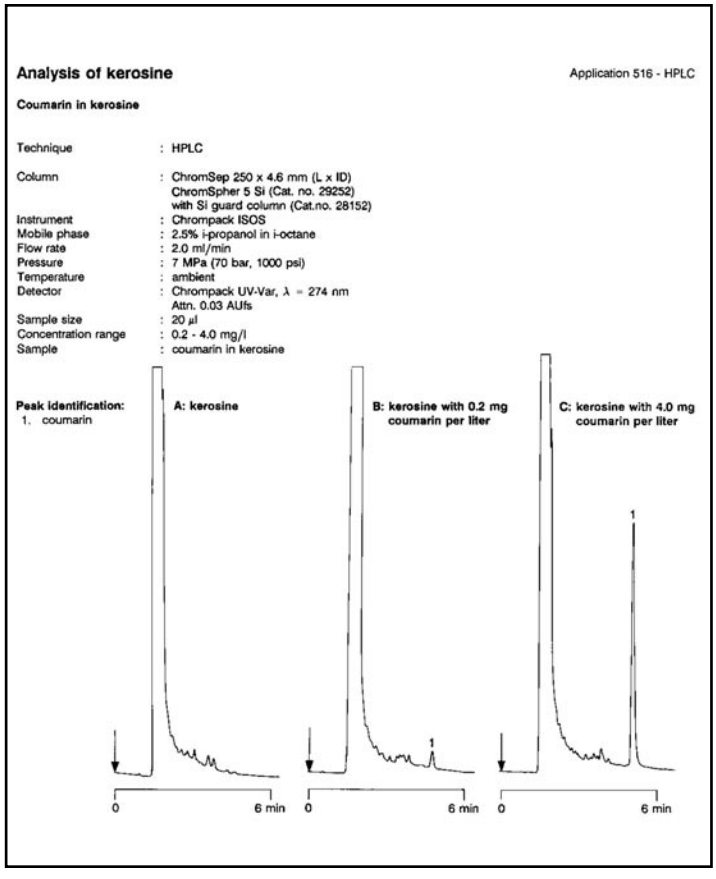
Spherical particles. 120Å Pore size.

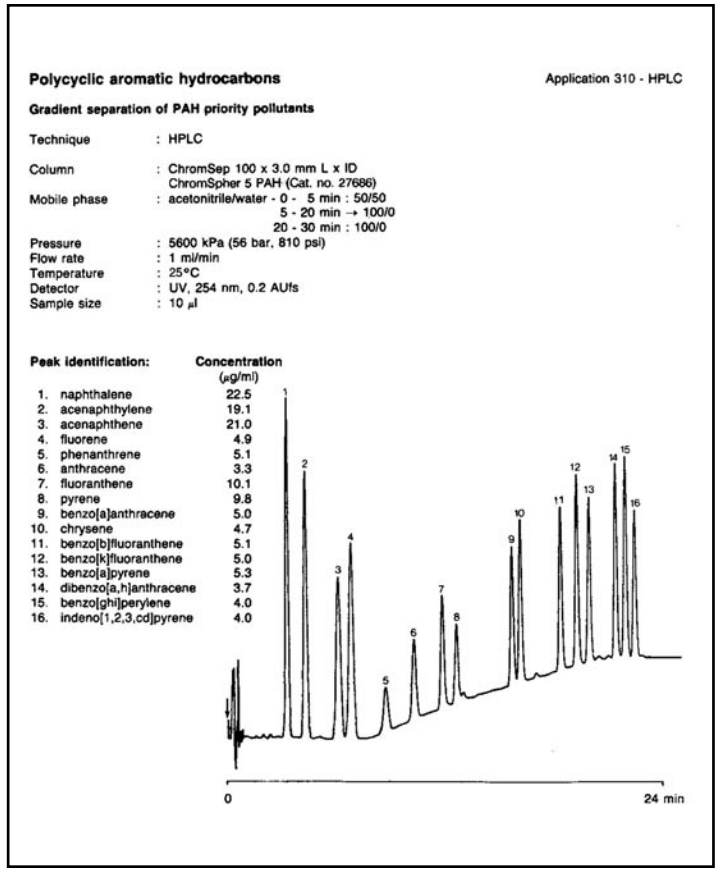
ID (mm)	Length (cm)	3 µm	5 µm
2	10	CP28539	
	25		CP28529
4.6	15		CP28251
	25		CP28253

ChromSpher Si ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 3 µm	Complete System 5 µm	Replacement	Replacement 3/Pk	Guard
3	15		CP29734	CP29834	CP29934	CP28142
	25		CP29735	CP29835	CP29935	CP28142
4.6	5	CP28003		CP28000	CP28002	CP28142
	10	CP28055		CP28051	CP28054	CP28142
			CP29250	CP29350	CP29450	CP28152
	15		CP29251	CP29351	CP29451	CP28152
	25		CP29252	CP29352	CP29452	CP28152





ChromSpher® PAH

- Ideal for the analysis of Polycyclic Aromatic Hydrocarbon components
- Trifunctional octadecyl-covered spherical silica, available in 3 and 5 µm particle sizes
- Superior reproducibility column after column and batch-to-batch
- Tested for efficiency and selectivity with respect to EPA and ASTM methods
- pH range: 2.0 - 8.0

Polynuclear Aromatic Hydrocarbons (PAHs) are nonpolar compounds. However polarity can be induced, due to their conjugated double bonds, to improve chromatographic separation. To separate PAHs with HPLC, reversed phase chromatography is the preferred procedure. Tandem UV - Fluorescence detection, or UV wavelength scanning detection, both enable quantitative as well as qualitative analysis.

Because of the similar chemical and physical properties of the different PAHs, the HPLC stationary phase must meet specific demands concerning pretreatment and derivatization so that good PAH selectivity may be achieved.

The most important difference between ChromSpher PAH and other C18-phases is its unique selectivity. ChromSpher PAH consists of silica particles covered with a "polymeric" layer of C18 groups rather than a monomeric layer, and this special layer provides its unmatched selectivity.

Depending on the complexity of the sample, analysis can be performed using isocratic or gradient conditions. For isocratic separation, acetonitrile/water (78/22 v/v) gives best selectivity, while temperature can be used to optimize selectivity.

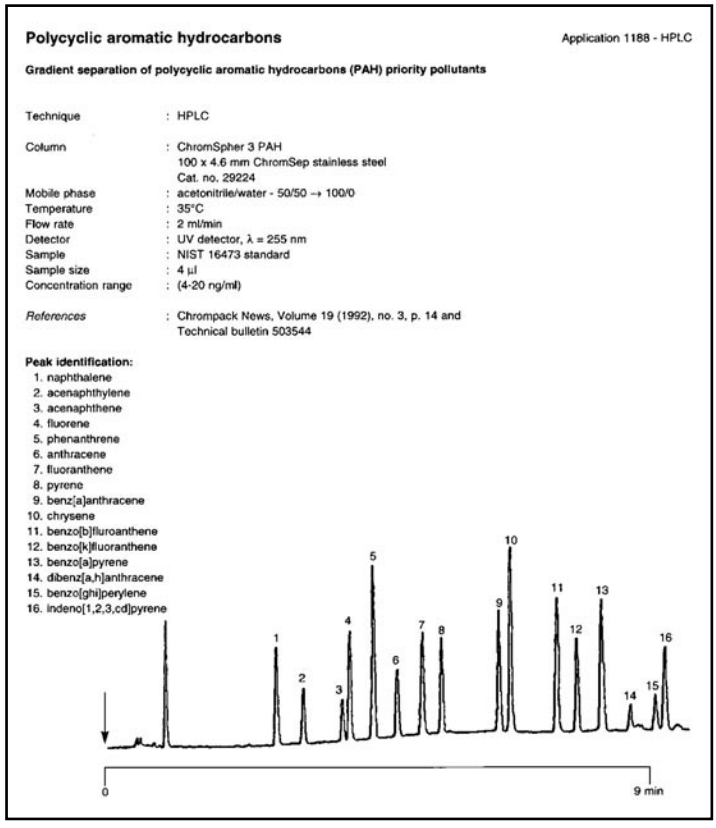
With this phase, it is possible to separate all 16 priority pollutant PAHs within one single isocratic run on a 10 cm column, except for the coeluting pair of acenaphthene and fluorene. Under gradient conditions, all 16 priority PAHs are separated.

The ChromSpher PAH columns are tested not only for efficiency, but also for selectivity with respect to EPA and ASTM methods. This guarantees base line separation column after column, batch after batch. The chromatographic performance and long term stability make ChromSpher PAH the favored column of scientists worldwide.

Compounds typically analyzed with these columns include: antioxidants and polycyclic aromatic hydrocarbons.

ChromSpher PAH columns are tested for efficiency and selectivity with respect to key EPA and ASTM methods, and are recommended for the following methods for PAH analyses:

– EPA 550.1 PAHs in drinking water
– EPA 610 PAHs in waste water
– EPA 8310 PAHs in solid waste
– EPA TO-13 PAHs in air
– ASTM D4657 PAHs in water
– NEN 5731 PAHs in soil
– NEN 2798 PAHs in air
– DIN 38407 PAHs in drinking water
– NF (France) T90-115 PAHs in water
– HMSO (UK) 1985 PAHs in water



ChromSpher PAH Conventional Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	3 µm	5 µm
2	10	**CP28543**	
	25		**CP28533**
4.6	15		**CP28309**

ChromSpher PAH ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 3 µm	Complete System 5 µm	Replacement	Replacement 3/Pk	Guard
4.6	5	**CP29223**		**CP29323**	**CP29423**	**CP28141**
	10	**CP29224**		**CP29324**	**CP29424**	**CP28141**
	15		**CP29275**	**CP29375**	**CP29475**	**CP28151**
	25		**CP29276**	**CP29376**	**CP29476**	**CP28151**

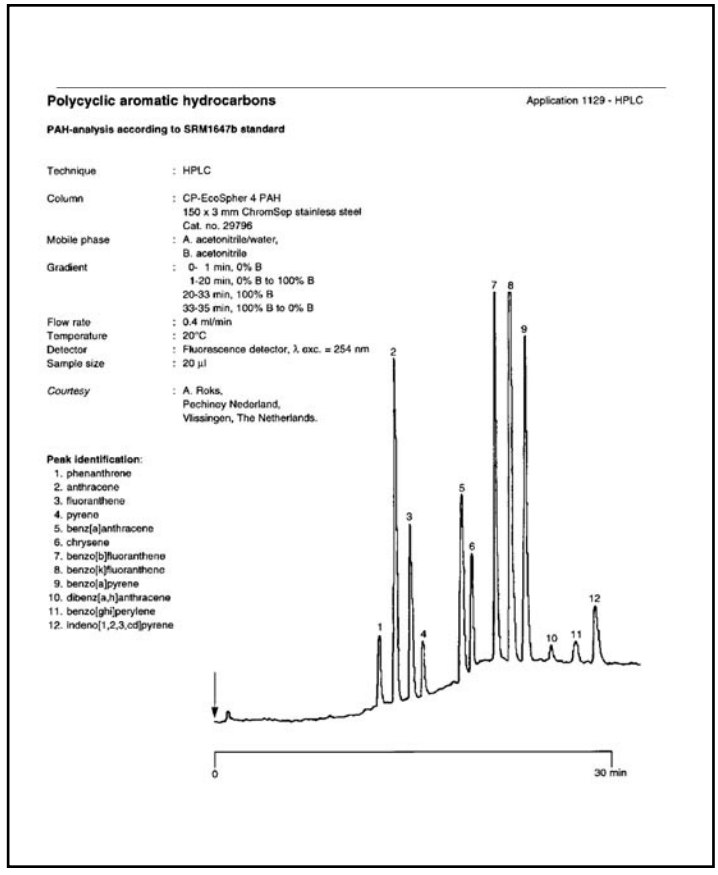
CP-EcoSpher® 4 PAH

- Trifunctional octadecyl-covered 4 µm spherical silica
- Improved quantification due to higher peak capacity; ideal for highly contaminated samples
- Less toxic solvent consumption; uses methanol/ water instead of acetonitrile/water
- Superior reproducibility column-to-column and batch-to-batch
- pH range: 2.0 - 8.0

Recently introduced CP-EcoSpher 4 PAH is designed to meet specific requirements in PAH analysis according to EPA and ASTM methods. It has a different selectivity from ChromSpher PAH, and complements Varian's range of HPLC columns for PAH analysis. The CP-EcoSpher 4 PAH column has a slightly different selectivity towards the 18 EPA PAHs, which include benzo[e]pyrene and perylene.

Under optimum conditions, the "peak capacity" is over 40, which is higher than that that of other PAH phases. Therefore, in addition to the 16 EPA PAHs, elution of another 23 analytes in the same run is possible. This enables analysis of highly contaminated samples.

For the analysis of relatively clean water samples, the high peak capacity of CP-EcoSpher 4 PAH offers possibilities for gradient elution optimization, resulting in faster analysis. Downsizing column dimension means using less solvent per analysis. Higher selectivity of CP-EcoSpher 4 PAH allows use of methanol/water mobile phases. Methanol is less expensive and less toxic than acetonitrile. The economic and ecological advantages are obvious: less solvent consumption, less pollution, and lower costs. Under optimum conditions using a methanol/water gradient, retention factors and selectivity factors are highly reproducible. Deviation of retention factor k is less than 4% column-to-column and less than 1% day-to-day. The deviation of the selectivity factor is less than 0.5% column-to-column and less than 0.1% day-to-day.



CP-EcoSpher 4 PAH Conventional Columns

Spherical particles. 150Å Pore size.

ID (mm)	Length (cm)	4 µm
2	15	**CP28552**
3	15	**CP29560**
4.6	15	**CP29561**

CP-EcoSpher 4 PAH ChromSep Columns

Spherical particles. 150Å Pore size.

ID (mm)	Length (cm)	Complete System 4 µm	Replacement	Replacement 3/Pk	Guard
3	15	**CP29796**	**CP29896**	**CP29996**	**CP28141**
4.6	15	**CP29293**	**CP29393**	**CP29493**	**CP28151**

ChromSpher® Pesticides

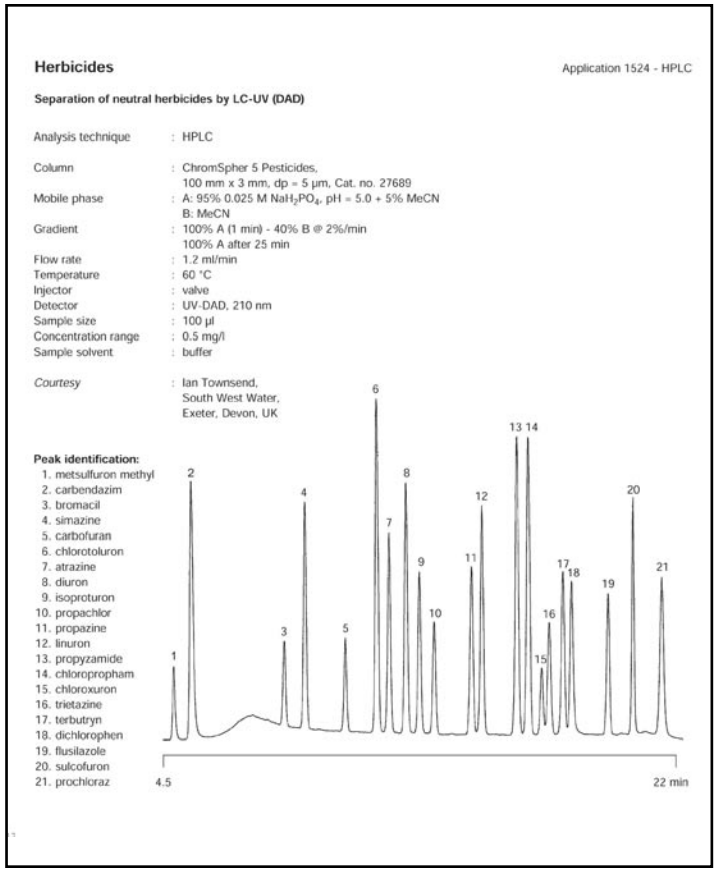
- No derivatization required
- High mechanically and chemically stable phase
- Superior column-to-column and batch-to-batch reproducibility, tested with representatives of several pesticide classes
- pH range: 2.0 to 8.0

The Varian ChromSpher Pesticides column is a special reversed phase material that is based on a trifunctional octadecyl-covered silica with a particle size of 5 µm. This material assures a high mechanical and chemical strength and excellent reproducibility.

ChromSpher Pesticide shows a remarkable selectivity for a wide range of pesticides, and is tested with representatives of several pesticide classes to ensure excellent performance from batch-to-batch as well from column-to-column.

When a wide range of pesticides has to be analyzed, gradient analysis with a shorter 15 cm column is the recommended approach. The longer 25 cm columns are recommended for isocratic analysis of related pesticides of similar polarity. Temperature is an important parameter for the pesticide analysis. It can be used to optimize separation and should be maintained constant for reproducible results.

This phase is ideal for the analysis of phenoxy acid herbicides and urea pesticides. It is especially recommended for thermally unstable, high-boiling, or very polar pesticides.



ChromSpher Pesticides Conventional Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	5 µm
2	25	**CP28534**
4.6	25	**CP28310**

ChromSpher Pesticides ChromSep Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	Complete System 5 µm	Replacement	Replacement 3/Pk	Guard
4.6	15	**CP29277**	**CP29377**	**CP29477**	**CP28151**
	25	**CP29278**	**CP29378**	**CP29478**	**CP28151**

ChromSpher® Lipids

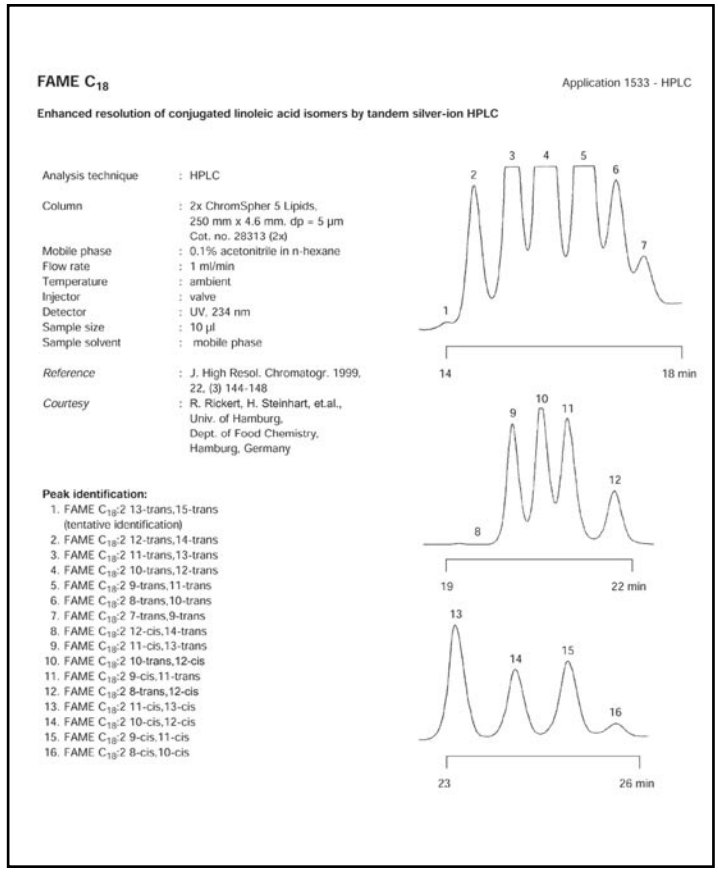
- Silver-modified cation exchange ligand-covered 5 µm spherical silica
- Ideal for the separation of Cis-Trans isomers of fatty acids
- Ideal for the analysis of isomers of triglycerides
- Separation on positional isomers in isocratic elution mode
- Reduced matrix effects
- No sample decomposition by high temperatures
- Separation based on degree of unsaturation
- pH range: 2.5 - 7.5

Each ChromSpher Lipids column produces a separation based on differences in the degree of unsaturation when using a dichloromethane/ dichloroethane (50/50) and acetone mobile phase with a linear gradient.

Retention increases as the number of double bonds increases, giving an elution order: SSS, SSM and SMS, SMM and MSM, SSD and SDS, MMM, SMD and SDM and MSD. Hardly any of the separation is based on chain length. All possible C16 and C18 combinations with the same degree of unsaturation elute as one peak.

Under isocratic conditions with a hexane/toluene/ethyl acetate mobile phase, separation of the positional unsaturates SSM and SMS are baseline separated. This is very important for quality control of fats and oils. Each ChromSpher Lipids column is tested for this critical separation.

Compounds typically analyzed with ChromSpher Lipids columns include: FAME C18/C18-C20 and triglycerides.



ChromSpher Lipids Conventional Columns

Spherical particles. 120Å Pore size.

ID (mm)	Length (cm)	5 µm
4.6	25	**CP28313**
10	25	**CP28509**

Contact your Varian, Inc. sales representative for a free copy, or use Scanview online at ***www.varianinc.com****, under Consumables, click Applications Online.*