HALO® 90 Å ES-CN, 2.7 µm Column Care & Use Sheet

Description
HALO® 90 Å ES-CN is a high-speed, high-performance liquid chromatography column based on 90 Å Fused-Core® particles. The Fused-Core® particle provides a thin porous shell of high-purity silica surrounding a solid silica core. This particle design exhibits very high column efficiency due to the shallow diffusion paths in the 0.5-micron thick porous shell and the small overall particle size of 2.7-microns. The sterically protected, extensively endcapped diisopropyl-cyanopropylsilane stationary phase of HALO® 90 Å ES-CN provides a stable, reversed-phase packing that can be used for basic, acidic, or neutral compounds.

Column Characteristics
The Fused-Core® particle has a surface area of ~ 135 m^2/g and an average pore size of 90 Å. The Fused-Core® particles are 30% to 50% heavier than commercially available totally porous particles due to the density of the solid cores. Therefore, the effective surface area per column is similar to columns packed with totally porous particles having surface areas of 225 - 300 m^2/g.

Operation Guidelines
- The direction of flow is marked on the column label.
- Reversed flow may be used to attempt removal of inlet pluggage or contamination.
- A new column contains 100% acetonitrile. Initial care should be taken to avoid mobile phases that are immiscible with this solvent or could cause a precipitate.
- Mobile phase pH for HALO® 90 Å ES-CN columns is best maintained in the range of pH = 1 to 8 for maximum column stability.
- HALO® 90 Å ES-CN columns have been application tested using low pH mobile phases (< 2) at operational temperatures up to 80ºC, and have been qualified to exhibit very long column life at 60 ºC at higher pH.
- HALO® 90 Å ES-CN columns are stable to operating pressures up to 600 bar (9000 psi).

Column Care
To maximize column life, ensure that samples and mobile phases are particle-free. The use of guard columns or an in-line filter with 0.5-micron porosity between the sample injector and the column is highly recommended. The 2-micron porosity frits on HALO® 90 Å ES-CN columns are less subject to pluggage than are the 0.5-micron frits typically used with other small-particle columns. Should the operating pressure of the column suddenly increase beyond normal levels, reversing the flow direction of the column may be attempted to remove debris on the inlet frit.
To remove strongly retained materials from the column, flush the column in the reverse direction with very strong solvents such as 100% of the organic component of the mobile phase in use. A mixture (95/5 v/v) of dichloromethane and methanol is often effective at removing lipidic contaminants and certain detergents. Extreme cases may require the use of very strong solvents such as dimethylformamide (DMF) or dimethylsulfoxide (DMSO).

Column Storage
Long-term storage of silica-based, reversed-phase columns is best in 100% acetonitrile. Columns may be safely stored for short periods (up to 3 or 4 days) in most common mobile phases. However, when using buffers, it is best to remove the salts to protect both the column and the HPLC equipment by flushing the column with the same mobile phase without the buffer. Before storing the column, the end-fittings should be tightly sealed with the end-plugs that came with the column.

Safety
- **HPLC columns are for laboratory use only. Not for drug, household, or other use.**
- Users of HPLC columns should be aware of the toxicity or flammability of the mobile phases chosen for use with the columns. Precautions should be taken to avoid contact and leaks.
- HPLC columns should be used in well-ventilated environments to minimize solvent fumes.

Applications
HALO® 90 Å ES-CN is moderately polar in nature and highly suited for the separation of acids, bases, and neutrals. It will often exhibit different selectivity compared to straight-chain alkyl phases, such as C8 and C18. The HALO® columns are best utilized with mobile phases that are mixtures of acetonitrile and water or methanol and water. Higher levels of the organic solvent component will typically reduce the retention of the sample compounds. Using elevated temperatures (e.g., 40 – 80 ºC) will reduce the viscosity of the mobile phase and allow the use of faster flowrates and lower column pressure for high sample throughput. Gradient-elution techniques using 5-10% organic component as the initial mobile phase and increasing to 100% organic component as the final mobile phase often can effect separations of complex sample mixtures in minimal time.
Ionizable compounds, such as acids and bases, are generally best separated with mobile phases buffered at pH of 2 to 3. The use of 10-50 mM buffers is always recommended for optimum results and long-term stability when separating ionizable compounds. Additional information on solvent selection and separation techniques can be found in Chapters Six, Seven, Eight, and Eleven in *Practical HPLC Method Development,* Second Edition, L.R. Snyder, J.L. Glajch, and J.J. Kirkland, (John Wiley & Sons, 1997).
HALO® 90 Å ES-CN columns utilize a steric-protected cyano bonded-phase with extremely high resistance to acid-catalyzed hydrolysis of the siloxane bond that attaches the cyanopropyl chain to the surface. Thus, the combination of low pH and elevated temperature operation of the column is well tolerated. Many separations are efficiently conducted using low pH mobile phase modifiers, often at 0.01-0.1% concentration, most popularly employing trifluoroacetic acid (TFA). Additional opportunities for low pH operation include the normal short chain carboxylic acids, formic acid and acetic acid, as well mineral acids, such as phosphoric acid (0.001-0.02 M).

Guidelines for Low-Volume Columns
High performance columns with small internal volumes (shorter lengths, internal diameters < 3 mm) are being increasingly used for high speed separations, especially with mass spectrometers. These low-volume columns generate peaks having considerably less volume than those eluting from columns of larger dimensions (e.g., 4.6 mm x 150 mm). The efficiency of separations performed in low-volume columns is highly dependent on the HPLC system having components designed to minimize band spreading. All low-volume columns perform best when used with proper attention to the following factors:
- Detector – Flow cell volumes should be < 2µl. To properly sense and integrate the very fast peaks that can elute from low-volume columns, the detector response time should be set to the fastest level (~ 0.1 second) to allow integration of signal by software of at least 20 points across the narrowest peak.
- Injector – The injection system should be of a low-volume design (e.g., Rheodyne Model 8125). Auto-samplers will often cause band-spreading, but may be used for convenience with the expectation of some loss in column efficiency.
- Connecting Tubing – The shortest possible lengths of connecting tubing with small internal diameters (≤ 0.005-inch, 0.12 mm ID) must be used to connect the column to the injector and the detector cell.
- Peak Retention – As retention is increased, the peak volume increases, decreasing extra-column band spreading caused by components of the instrument.
- Sample Injection – For isocratic separations, the volume of sample injected should be kept as small as possible (≤ 2 µl) in a solvent weaker than the mobile phase. Sample volumes are less critical for gradient separations, and a larger volume is possible if the sample is dissolved in a weak solvent.

Ordering Information
For ordering information or for technical support on this product, please contact your local HALO® distributor at advanced-materials-tech.com

advancedmaterialstechnology