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Shimadzu Packed Column for Micro-flow HPLC

Shim-pack

MC PLONAS AQ-C18

INSTRUCTION MANUAL

■ Description

Shim-pack MC PLONAS AQ-C18 is a high-speed, high-performance liquid chromatography column based on the SPP particle design. The SPP 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. MC PLONAS AQ-C18 is a C18 bonded phase prepared using a proprietary procedure that incorporates a small amount of polar silane which makes the phase resistant to dewetting. This resistance to dewetting allows the users of the AQ-C18 phase to run highly-aqueous (up to 100%) mobile phases. The modified C18 phase exhibits similar retention to HALO® C18 with a different selectivity, adding a valuable alternative for resolving difficult separations. MC PLONAS AQ-C18 is a reversed-phase packing that can be used for basic, acidic, and neutral compounds.

■ Column Characteristics

The SPP particle has a surface area of ~ 135 m^2/g and an average pore size of 90 Å. The SPP 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 in the 225-300 m^2/g range.

■ Operation Guidelines

•The direction of flow is marked on the column label.
•Running the column in the reversed flow direction is not recommended.
•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.
•Water and all common organic solvents are compatible with MC PLONAS AQ-C18 columns.
•MC PLONAS AQ-C18 columns are best used at temperatures below 60 ºC for maximum column life.
•Mobile phase pH for MC PLONAS AQ-C18 columns is best maintained in the range of pH = 2 to 9 for maximum column stability.

MC PLONAS Nano/Capillary Columns	
ID (microns)	Max Pressure (bar)
200-500	400

■ 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 MC PLONAS AQ-C18 columns are less subject to pluggage than are the 0.5-micron frits typically used with other small-particle columns. To remove strongly retained materials from the column, flush the column 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 this task. 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 protect both the column and the HPLC equipment and remove the salts by flushing the column with the same mobile phase without the buffer (e.g., when using 60/40 ACN/buffer, flush the column with 60/40 ACN/H2O) to eliminate any danger from corrosion from the salts while providing rapid re-equilibration of the column with the original mobile phase. Before storing the column, the end-fittings should be tightly sealed with the end-plugs that came with the column to prevent the packing from drying.

■ 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 concentration of solvent fumes.

■ Applications

The MC PLONAS AQ-C18 bonded phase is 100% aqueous compatible. Equilibration for about 30 column volumes is recommended when switching between totally aqueous mobile phase and mixtures of organic solvent and water or buffer. It is best utilized with mobile phases that are mixtures of methanol and water or acetonitrile and water. Higher levels of the organic solvent component will typically reduce the retention of the sample compounds. Using elevated temperatures (e.g., 40 – 60 ºC) will reduce the viscosity of the mobile phase and allow the use of faster flow rates and lower column pressure for high sample throughput. Gradient elution techniques using 0 -5% 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 20-50 mM buffers is always recommended for optimum results and long-term stability when separating ionizable compounds.

■ Guidelines for Low-Volume Columns

High performance columns with small internal volumes (shorter lengths, internal diameters < 0.5 mm) are increasingly used for high sensitivity and high speed separations, especially with specialty detection systems such as 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:
• LC/MS – Most nano/capillary columns are utilized with the Mass Spec as the detector. Spray tips should be of low-volume design (preferably ~20nL or less) to minimize band spreading.
•UV Detector – Flow cells should be of low-volume design (preferably ~20nL or less) to minimize band spreading. To properly sense and integrate the often very fast peaks that elute from low-volume columns, the detector response time should be set to the fastest level (~ 0.1 second) and the integration software should sample the detector signal at least 20 points per second.
•Injector – The injection system should be of a low-volume design (nano). The volume of sample injected should be kept as small as possible. It is highly recommended that a concentration trap cartridge is used to reduce injection volume and remove unwanted salts.
•Connecting Tubing – The shortest possible lengths of connecting tubing with narrow internal diameters (at most 50µm ID) should be used to connect the column to the injector and the detector cell. The tubing must have flat ends and should bottom out inside all fittings. Zero-dead-volume fittings should always be used where required.
•Peak Retention – As retention is increased, the volume of a peak increases, decreasing the effects on band spreading caused by components of the instrument.
•Sample Solvent – For isocratic separations, the sample should be dissolved in the mobile phase or in a solvent that is weaker (more polar) than the mobile phase. For gradient separations, the sample should be dissolved in the initial mobile phase or in a solvent substantially weaker than the initial mobile phase.

■ Technical Support

Shim-pack MC PLONAS series columns are manufactured, inspected, packaged and shipped under strict standards of quality control. Should you find any defect in performance, please contact your local Shimadzu representative, who will ensure your complete satisfaction.
We regret that we cannot guarantee the lifetime of columns, also that we cannot accept any claim when performance has deteriorated due to noncompliance with the operation procedures elucidated above, or as a result of normal aging.