

○ Polymeric partition chromatography columns and materials MCI GEL™ CHP series

Separation mechanism of CHP series

High performance liquid chromatography relies on one of the following physical phenomena for efficient separation of solutes: partition, adsorption, size exclusion, or ion exchange. Of these, partition chromatography is the most commonly used method, and it separates solutes based on their difference in partitioning between a stationary phase and a mobile phase. This technique has currently become the mainstay in industry for the separation of organic compounds such as pharmaceuticals, agricultural chemicals, and other intermediates. Practically, partition chromatography can be performed in two different modes depending on the relative polarities of the stationary and mobile phases. In the normal phase (NP) mode, the mobile phase is less polar than the stationary phase while the situation is reversed in the reverse phase (RP) mode, where the mobile phase is significantly more polar than the stationary phase.

MCI GEL™ specializes in polymer-based packing materials. The use of polymer-based columns has become more widespread thanks to the many advantages of the polymer matrix like excellent selectivity, the absence of specific adsorption which is found commonly with silica-based packing, operability in a wide pH range and good chemical stability due to the inert nature of polymeric materials. The MCI GEL™ partition chromatography columns are based on a polystyrene and polymethacrylate porous polymer. As RP columns, they are applied to the separation of a wide variety of organic compounds, both in the isocratic and gradient elution mode. The compounds include peptides, insulin, small molecule APIs, nutraceutical compounds, water-soluble vitamins and nucleotides. As NP columns, they are used in the separation of various carotenoids, fat-soluble vitamins, steroids, and food additives. These columns tolerate various organic solvents like hexane, heptane, methylene chloride, and alcohols.

As NP columns, they are used in the separation of various carotenoids, fat-soluble vitamins, steroids, and food additives. Various organic solvents like Hexane Heptane, methylene chloride and alcohols can be used.

The MCI GEL™ packing materials are based on the same chemistries offered in the Diaion™ and Sepabeads™ synthetic adsorbent resins. These polymer chemistries, like Diaion™ HP series and Sepabeads™ SP series, are widely used and documented in the biopharmaceutical industry for fermentation extraction, the food industry and in industrial chromatographic separations. The MCI GEL™ packing materials are available as packed columns for analytical applications, and as bulk packing materials for analytical, preparative and production chromatography applications.

● Description of MCI GEL™ columns and materials

MCI GEL™ CHP20/C04

Matrix type

Particle size

{ C=Column
P=Material

CHP column series

Analytical and preparative chromatography columns and materials for pharmaceutical applications

MCI GEL™ CHP series are suitable for RP and NP chromatography. There are four kinds of columns of various hydrophobicities; porous polystyrene, modified porous polystyrene, polymethacrylate, and modified porous polymethacrylate. This range of packing materials offers tremendous scope for a proper selection of columns based on the properties of the target compounds.

Polystyrene packing: MCI GEL™ CHP20/C04, CHP20/C10

Modified polystyrene packing: MCI GEL™ CHP07/C04, CHP07/C10, CHK40/C04

Polymethacrylate packing: MCI GEL™ CMG20/C10

Modified polymethacrylate packing: MCI GEL™ CHPOD/C04, CHK45/C05

The hydrophobicities of the columns are in the following orders:

MCI GEL™ CHP07/C04, C10 > CHP20/C04, C10 > CHPOD/C04 ≥ ODS columns ≥ CMG20/C04, C10

Polymer columns for HPLC, with their superior chemical resistance, can be used with various mobile phases of broad pH range, acidic through alkaline. They have the following advantages due to their high hydrophobicities:

- 1) In reverse phase chromatographic methods to separate acidic or alkaline compounds, eluents that can suppress the ionic properties of such compounds are generally used. Polymer columns can be applied in these cases where ODS columns would be unsuitable.
- 2) Some extremely hydrophilic compounds, e.g., oligosaccharides, can be separated using strongly hydrophobic CHP07/C04 or CHP07/C10 columns.
- 3) Polymer columns can be washed with acidic and/or basic solutions in case of contamination.

Polymethacrylate columns, CMG20/C04 and CMG20/C10, can be applied both for reverse phase and normal phase chromatography.

Modified polystyrene packing, CHK40/C04, is a mixed-mode type material; both hydrophobic and hydrophilic interactions occur between the packing material surface and the analytes. This material is useful for compounds that are difficult to separate using existing ODS or other polymer-based columns. This column is also used in the normal phase mode and shows a unique separation profile.

All polymeric columns exhibit superior stability and yield in comparison to ODS columns, which may have free silanol groups even when end-capping agents have been used.

Column list

●CHP column series

| Matrix Type | Functional group | Product name | Particle size [μm] | Column size [mm I.D.×mm] | pH range | USP |
|------------------------|----------------------------|--------------|--------------------|--------------------------------------------------|------------|-----|
| Styrene Divinylbenzene | None | CHP20/C04 | 4 | 4.6×150 20×150 | Full range | L21 |
| | | CHP20/C10 | 10 | 4.6×150 4.6×250 10×250 20×150 20×250 | | |
| | Br | CHP07/C04 | 4 | 4.6×150 20×200 | | |
| | | CHP07/C10 | 10 | 4.6×150 4.6×250 10×150 20×150 20×250 | | |
| | Cation exchange group | CHK40/C04 | 4 | 4.6×150 | | |
| Methacrylates | None | CMG20/C04 | 4 | 4.6×150 20×150 | 2~12 | |
| | | CMG20/C10 | 10 | 4.6×150 4.6×250 10×250 20×150 20×250 | | |
| | C18 | CHPOD/C04 | 4 | 4.6×150 20×200 | | |
| | Weak cation exchange group | CHK45/C05 | 5 | 4.6×150 | | |
| | | | | | | |

*CHP20/C04, CHP20/C10: USP classification is L21