[PRODUCT SOLUTION]

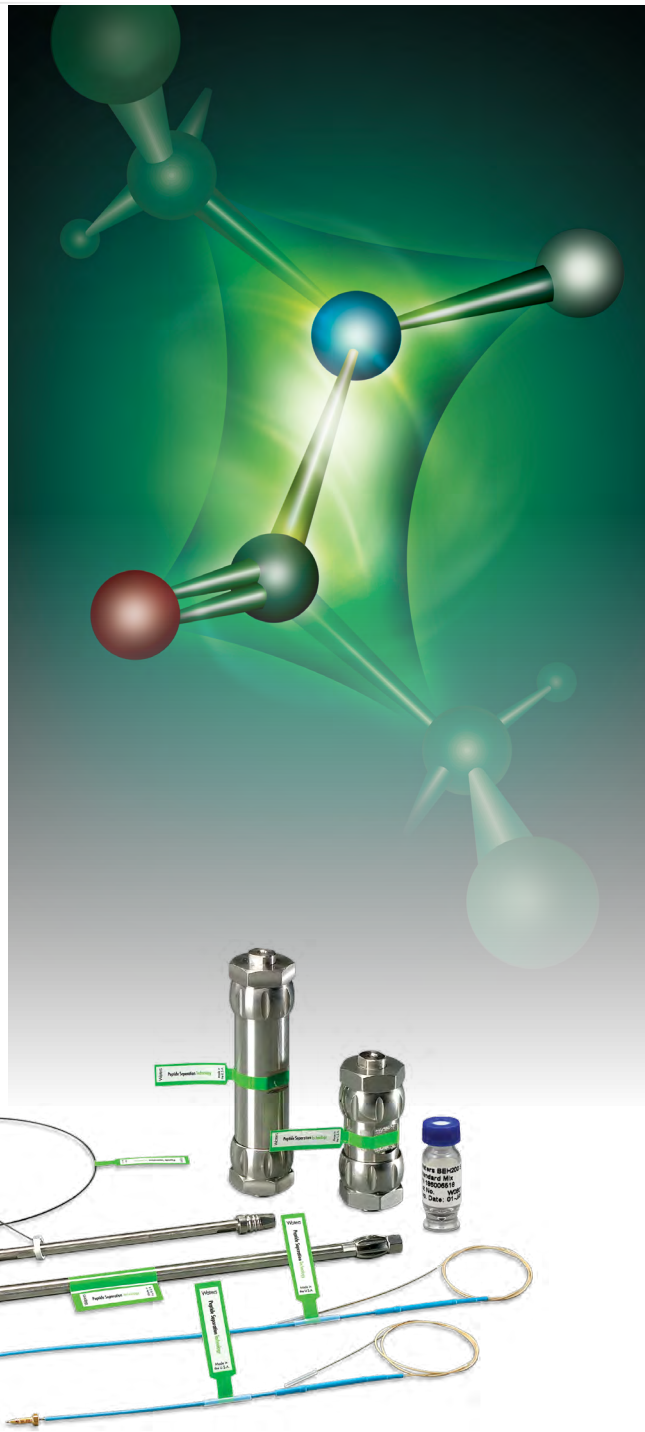
Waters
THE SCIENCE OF WHAT'S POSSIBLE.®

CSH130 C_{18} Columns for Peptide Separations

Charged Surface Hybrid particles deliver superior peptide separations in LC or LC-MS applications

Waters patented synthesis process for its Charged Surface Hybrid (CSH™ Technology) particles imparts a low level positive charge to the surface of each particle. CSH Technology allows the columns to be successfully used with standard TFA-containing eluents or with a weaker acid modifier such as formic acid. This means users no longer have to compromise between selecting a reversed-phase eluent that delivers needed sharp and symmetrical separated peaks (e.g., 0.1% trifluoroacetic acid [TFA]) and one that minimizes reduction of MS signal (e.g., 0.1% formic acid [FA]). In similar fashion, the ability of the CSH130 C_{18} chemistry to accept greater peptide mass loads than on many other columns will enhance the ability to detect potentially important low level constituents contained with the major component(s) of interest.

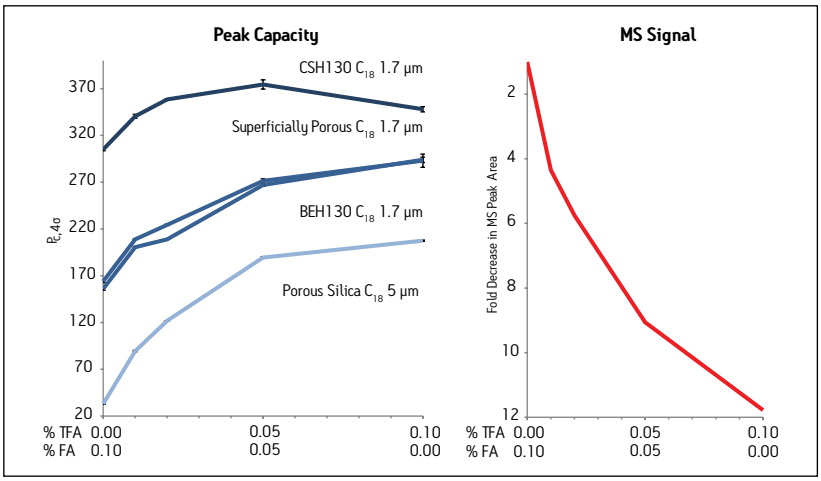
- Outstanding peak capacities in HPLC, UPLC®, or LC-MS separations of peptide and small proteins up to approximately 10,000 Daltons using either 0.1% FA- or 0.1% TFA-containing eluents.
- Excellent mass loading of complex peptide samples for peptide mapping, proteomics applications, or for the analysis and lab-scale purification of synthetic peptides.
- Scalable chemistries from nano flow analysis to lab-scale purification.
- QC tested with a cytochrome *c* tryptic digest using 0.1% FA-containing eluents to help ensure column-to-column reproducibility for consistent performance in validated methods.



SUPERIOR PERFORMANCE IN EITHER FA- OR TFA-CONTAINING ELUENTS

Waters CSH130 C_{18} particles contain a low and carefully-defined concentration of positive charges that yield comparatively excellent peak shape for peptides using either FA- or TFA-containing mobile phases. The fact that the performance of a CSH130 C_{18} column exhibits little dependence on strong ion pairing agents makes it ideal for LC or LC-MS applications.

Comparative Averaged Peptide Peak Capacities on Selected Reversed-Phase Columns with Differing Concentrations of FA and TFA

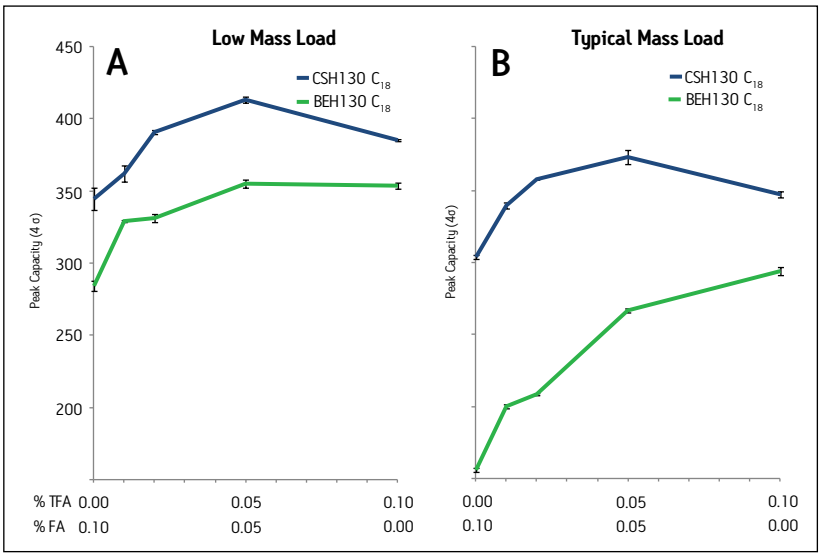


Effect of TFA on peak capacity and MS signal. (A) Peak capacity as a function of acid modifier. Values were derived from two replicates. (B) Fold decrease in MS peak area as a function of acid modifier. Waters MassPREP™ Peptide Standard Mixture (P/N 186002337) was used in study.

EXCELLENT MASS LOADING OF COMPLEX PEPTIDE SAMPLES

One of the inherent performance advantages of CSH technology is improved sample mass loadability—how much analyte can be loaded onto a column before peak shape deteriorates. Clearly, at typical mass loads, CSH130 C_{18} delivers remarkably better performance than many existing C_{18} offerings. When loading 10x less sample, the difference in performance was less pronounced. Improved peptide mass loadability is an excellent column asset for challenging separations, particularly those that involve mixtures comprised of species present at vastly different concentrations.

Comparative Averaged Peptide Peak Capacities on CSH130 vs. BEH130-based, C_{18} Columns (2.1 x 150 mm) at Two Peptide Mass Loads and Differing Concentrations of FA and TFA

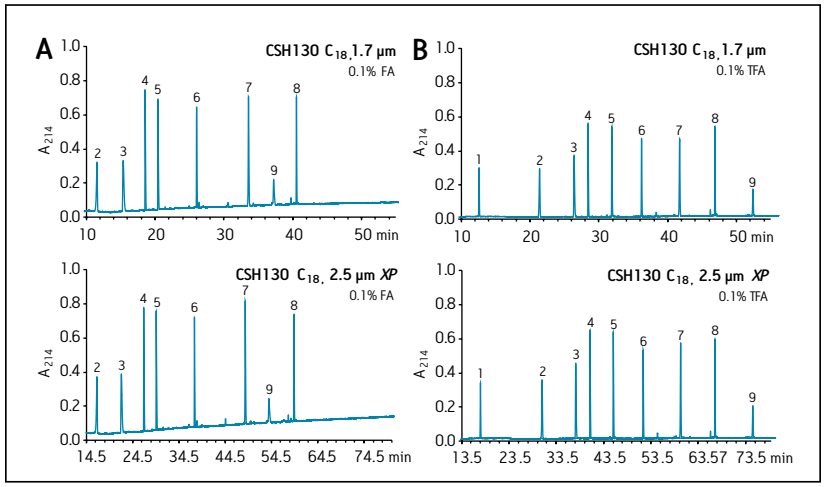


Effect of Peptide Mass Load in FA, TFA, and FA/TFA blends on peak capacity. (A) approx. 0.06 µg peptide mixture sample load. (B) approx. 0.6 µg peptide mixture. Values were derived from two replicates. Waters MassPREP Peptide Standard Mixture (P/N 186002337) was used in study.

SCALABLE COLUMN OFFERINGS FOR HPLC- OR UPLC-BASED SEPARATIONS

There remains a need for columns that are compatible with HPLC instrumentation. Low dispersion LC instrumentation is recommended in order to get full performance from a well-packed column containing 1.7 µm particles. The recent introduction of Waters e***X***tended ***P***erformance [***XP***] columns packed with 2.5 µm particles has allowed scientists to improve their existing HPLC instrumentation productivity. The high peak capacity peptide separations obtained with a CSH130 C_{18}, 1.7 µm column could, for instance, be successfully scaled to a CSH130 C_{18}, 2.5 µm ***XP*** column by correct scaling of the flow rate and the gradient time. As shown below, CSH technology can therefore be readily employed for high peak capacity peptide separations using either UPLC or HPLC instrumentation.

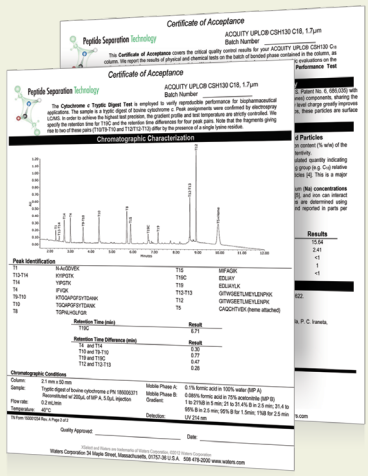
Comparative Separation of MassPREP Peptide Standard Mixture on ACQUITY UPLC CSH130 C_{18}, 1.7 µm vs. XSelect CSH130 C_{18}, 2.5 µm offering in 0.1% FA- or 0.1% TFA-Containing Eluents



*Chromatograms of Waters MassPREP Peptide Standard Mixture (P/N 186002337) obtained with (A) 0.1% FA and (B) 0.1% TFA mobile phases. The method for the CSH130 C_{18}, 2.5 µm **XP** column was scaled from the method for the CSH130 C_{18}, 1.7 µm column by decreasing flow rate and increasing gradient time by a factor of 1.5. Backpressure on the XSelect® CSH130 C_{18}, 2.5 µm **XP**, 2.1 x 150 mm column was 3,000 psi while a backpressure value of 8,000 psi was generated on the ACQUITY UPLC® CSH130 C_{18}, 1.7 µm. 2.1 x 150 mm offering.*

INCREASED ASSURANCE WITH WATERS PEPTIDE SEPARATION TECHNOLOGY (PST) COLUMNS

Each batch of Waters CSH130 C_{18} material is QC tested with a cytochrome c tryptic digest to help ensure column-to-column reproducibility. This important quality test is performed with a gradient separation and 0.1% FA-containing eluents that challenges batch performance to help ensure consistent column performance for research or validated method requirements.



Certificate of Analysis information includes a labeled chromatogram of the gradient separation of a tryptic digest of bovine cytochrome c (Waters P/N 186006371) using 0.1% FA containing eluents. The same protein digest test mixture can be purchased by customers to ensure CSH130 C_{18} column performance.

ORDERING INFORMATION

ACQUITY UPLC and XSelect CSH130 C_{18} Analytical Columns

Kit Part Number[a]	Part Number	Description
176003061	186006933	ACQUITY UPLC CSH130 C_{18}, 1.0 x 50 mm, 1.7 µm Column
176003062	186006934	ACQUITY UPLC CSH130 C_{18}, 1.0 x 100 mm, 1.7 µm Column
176003063	186006935	ACQUITY UPLC CSH130 C_{18}, 1.0 x 150 mm, 1.7 µm Column
176003064	186006936	ACQUITY UPLC CSH130 C_{18}, 2.1 x 50 mm, 1.7 µm Column
176003065	186006937	ACQUITY UPLC CSH130 C_{18}, 2.1 x 100 mm, 1.7 µm Column
176003066	186006938	ACQUITY UPLC CSH130 C_{18}, 2.1 x 150 mm, 1.7 µm Column
176003067	186006939	ACQUITY UPLC CSH130 C_{18} 2.1 x 50 mm, 1.7 µm VanGuard™ Column, 3/pk
176003068	186006940	ACQUITY UPLC CSH130 C_{18}, 2.1 x 150 mm, 1.7 µm Column Method Validation Kit[b]
176003069	186006941	XSelect CSH130 C_{18}, 2.1 x 50 mm XP, 2.5 µm Column
176003070	186006942	XSelect CSH130 C_{18}, 2.1 x 100 mm XP, 2.5 µm Column
176003071	186006943	XSelect CSH130 C_{18}, 2.1 x 150 mm XP, 2.5 µm Column
176003072	186006944	XSelect CSH130 C_{18}, 2.1 x 5 mm 2.5 µm VanGuard Column, 3/pk
176003073	186006945	XSelect CSH130 C_{18}, 2.1 x 100 mm XP, 2.5 µm Column Method Validation Kit[b]
176003074	186006946	XSelect CSH130 C_{18}, 4.6 x 50 mm XP, 2.5 µm Column
176003075	186006947	XSelect CSH130 C_{18}, 4.6 x 100 mm XP, 2.5 µm Column
176003093	186007038	XSelect CSH130 C_{18}, 4.6 x 150 mm XP, 2.5 µm Column
176003076	186006966	XSelect CSH130 C_{18}, 4.6 x 100 mm XP, 2.5 µm Column Method Validation Kit[b]
176003077	186006950	XSelect CSH130 C_{18}, 2.1 x 50 mm, 3.5 µm Column
176003078	186006951	XSelect CSH130 C_{18}, 2.1 x 100 mm, 3.5 µm Column
176003079	186006952	XSelect CSH130 C_{18}, 2.1 x 150 mm, 3.5 µm Column
176003080	186006953	XSelect CSH130 C_{18}, 2.1 x 100 mm, 3.5 µm Column Method Validation Kit[b]
176003081	186006954	XSelect CSH130 C_{18}, 2.1 x 10 mm, 3.5 µm Guard Column, 2/pk[c]
176003082	186006955	XSelect CSH130 C_{18}, 4.6 x 50 mm, 3.5 µm Column
176003083	186006956	XSelect CSH130 C_{18}, 4.6 x 100 mm, 3.5 µm Column
176003084	186006957	XSelect CSH130 C_{18}, 4.6 x 150 mm, 3.5 µm Column
176003085	186006958	XSelect CSH130 C_{18}, 4.6 x 20 mm, 3.5 µm Guard Column, 2/pk[d]
176003086	186006959	XSelect CSH130 C_{18}, 4.6 x 100 mm, 3.5 µm Column Method Validation Kit[b]
	186006371	Cytochrome c Digestion Standard

[a] Kit includes CSH130 C_{18} Column plus one vial of Cytochrome c Digestion Standard (P/N 186006371)

[b] Each kit contains 3 columns from 3 different batches of CSH130 C_{18} material

[c] Requires 2.1 x 10 mm Universal Sentry Guard Holder, P/N WAT097958

[d] Requires 4.6 x 20 mm Universal Sentry Guard Holder, P/N WAT046910

ORDERING INFORMATION

ACQUITY UPLC M-Class CSH C_{18}, 130Å Columns for Nano- and Capillary-Scale UPLC Separations

Part Number	Description
186007479	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 100 µm x 100 mm Column, 1/pkg
186007480	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 150 µm x 100 mm Column, 1/pkg
186007513	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 150 µm x 50 mm Column, 1/pkg
186007514	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 150 µm x 150 mm Column, 1/pkg
186007475	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 75 µm x 100 mm Column, 1/pkg
186007476	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 75 µm x 150 mm Column, 1/pkg
186007477	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 75 µm x 200 mm Column, 1/pkg
186007478	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 75 µm x 250 mm Column, 1/pkg
186007561	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 300 µm x 50 mm Column, 1/pkg
186007562	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 300 µm x 100 mm Column, 1/pkg
186007563	ACQUITY UPLC M-Class Peptide CSH C_{18}, 130Å, 1.7 µm, 300 µm x 150 mm Column, 1/pkg

XSelect CSH130 C_{18} Preparative Columns

Part Number	Description
186007076	XSelect CSH130 C_{18}, 4.6 x 50mm, 5 µm Column[e]
186007077	XSelect CSH130 C_{18}, 4.6 x 100mm, 5 µm Column[e]
186007078	XSelect CSH130 C_{18}, 4.6 x 150mm, 5 µm Column[e]
186007018	XSelect CSH130 C_{18}, 10 x 50 mm, 5 µm Column
186007032	XSelect CSH130 C_{18}, 10 x 100 mm, 5 µm Column
186007016	XSelect CSH130 C_{18}, 10 x 150 mm, 5 µm Column
186007017	XSelect CSH130 C_{18}, 10 x 250 mm, 5 µm Column
186007015	XSelect CSH130 C_{18}, 10 x 10 mm, 5 µm Guard[f]
700001436	Replacement O-Ring, 10 mm (2/pk)
186007022	XSelect CSH130 C_{18}, 19 x 50 mm, 5 µm OBD Column
186007020	XSelect CSH130 C_{18}, 19 x 100 mm, 5 µm OBD Column
186007021	XSelect CSH130 C_{18}, 19 x 150 mm, 5 µm OBD Column
186007031	XSelect CSH130 C_{18}, 19 x 250 mm, 5 µm OBD Column
186007019	XSelect CSH130 C_{18}, 19 x 10 mm, 5 µm Guard[g]
700001020	Replacement O-Ring, 19 mm (2/pk)
186007026	XSelect CSH130 C_{18}, 30 x 50 mm, 5 µm OBD Column
186007025	XSelect CSH130 C_{18}, 30 x 100 mm, 5 µm OBD Column
186007023	XSelect CSH130 C_{18}, 30 x 150 mm, 5 µm OBD Column
186007024	XSelect CSH130 C_{18}, 30 x 250 mm, 5 µm OBD Column
186007030	XSelect CSH130 C_{18}, 50 x 50 mm, 5 µm OBD Column
186007027	XSelect CSH130 C_{18}, 50 x 100 mm, 5 µm OBD Column
186007028	XSelect CSH130 C_{18}, 50 x 150 mm, 5 µm OBD Column
186007029	XSelect CSH130 C_{18}, 50 x 250 mm, 5 µm OBD Column

[e] For use in developing lab-scale preparative chromatography

[f] Requires 10 x 10 mm Cartridge Holder, Part No. 289000779

[g] Requires 19 x 10 mm Cartridge Holder, Part No. 186000709

References:

1) "Increasing Peak Capacity in Reversed Phase Peptide Separations with Charged Surface Hybrid (CSH) C_{18} Columns"
M.A. Lauber, S.M. Koza, K.J. Fountain
Waters Application Note, 720004568EN, 2013

2) "Peptide Mapping and Small Protein Separations with Charged Surface Hybrid (CSH) C_{18} and TFA-Free Mobile Phases"
M.A. Lauber, S.M. Koza, K.J. Fountain
Waters Application Note, 720004571EN, 2013

3) "Charged Surface Hybrid (CSH) Technology and Its Use in Liquid Chromatography"
P.C. Iraneta, K.D. Wyndham, D.R. McCabe, and T.H. Walter
Waters White Paper, 720003929EN, 2011

4) "Characterization and evaluation of C18 HPLC stationary phases based on ethyl-bridged hybridorganic/inorganic particles"
Wyndham, K. D.; O'Gara, J. E.; Walter, T. H.; Glose, K. H.; Lawrence, N. L.; Alden, B. A.; Izzo, G. S.; Hudalla, C. J.; Iraneta, P. C., Anal Chem 2003, 75 (24), 6781-8.

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Waters Corporation
34 Maple Street
Milford, MA 01757 U.S.A.
T: 1 508 478 2000
F: 1 508 872 1990
www.waters.com