

The use of high quality silica media in pilot and process scale chromatography using custom designed high pressure process LC columns and systems.

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Introduction

In pharmaceutical and biotech industries the analytical and preparative labs are optimizing separations of their compounds of interest. Once results optimized it will be necessary to scale up this separation to a larger scale either in pilot or production scale. In contrast to analytical separations that ask for the best possible resolution of all compounds in a crude mixture the main goal of this up-scaling to the process scale is to obtain high levels of purity of only the compound of interest combined with its high recovery or yield.

The key factors to the success of this process will be the packing medium and the equipment used. Media need to be of high quality (can be either irregular or spherical) so unwanted interactions with the compounds are avoided. Loading capacity, throughput and price are important commercial parameters to consider.

The columns and equipment need to comply with pharma and biotech standards as well as with the local engineering and safety regulations and need to be flexible to meet all requirements for the specific purification needs.

Davisil® Irregular Silica Media



- High surface area
- Narrow particle size distribution
- Wide range of pore sizes and particle sizes
- Predictable scale up
- Available in bonded (RP and NP) and unbonded version

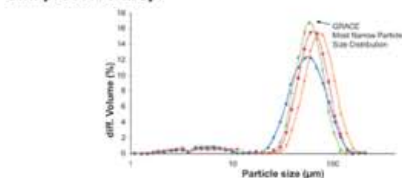
A wide range of Davisil® silica grades are available to meet performance and economic requirements.

Typical Physical and Chemical Characteristics

Characteristic	Nominal Pore Size							
	35A	65A	150A	250A	500A	1000A	1500A	2500A
Surface Area (m ² /g)	700	550	330	285	80	40	25	17
Pore Volume (ml/g)	0.4	0.9	1.2	1.8	1.1	1.1	1.1	1.1
pH (5% suspension)	4	7.3	7.3	7.5	8.0	9.0	9.0	9.0
H ₂ O Iweight %	<6%	<6%	<6%	<6%	<6%	<6%	<6%	<6%
Bulk Density (kg/m ³)	720	530	350	210	370	370	370	370

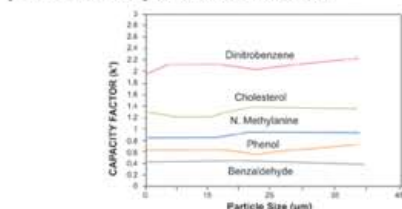
Moisture content (% H₂O) can be tailored (increased or decreased) to meet customer requirements.

Narrow particle size distribution to optimize efficiency and pressure drop.



*All comparative data generated on chromatographic silica labeled MA, 40-50µm.

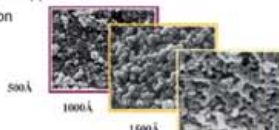
In scaling up Davisil® silica will offer consistent performance as particle size increased.



Uniform capacity (k') and selectivity (k'') factors across all particle sizes for predictable scale-up

XWP Silica

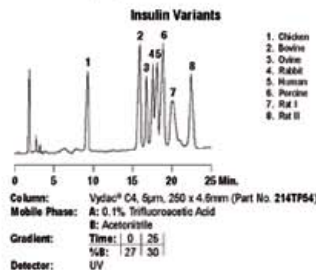
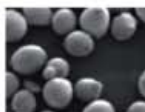
- Ideal for large biological molecules
- Particle size adjustable to the application
- Narrow pore size distribution



A proprietary production process ensures an ideal combination of large pores with a narrow distribution and excellent mechanical strength of the particles. It is the preferred material for nucleic acid purifications

Vydac® Spherical silica media

- Recommended for protein and peptide separations
- 300Å reversed phase media
- High selectivity and capacity
- Available from 3 to 30µm particles



Highly selective Vydac® material separates compounds with only small changes of amino acids sequence

Pilot to production scale Peak Biotech columns

- Easy packing and unpacking
- Uniform distribution system
- Removable frit design for easy cleaning or replacement
- High performance and reproducibility
- Leak detection system
- No sealing adjustment necessary
- Fully Scalable
- Mobile construction up to 300 mm
- Ergonomic working positions

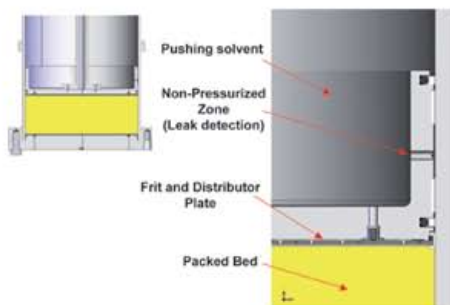


Columns are available with I.D.s from 50 to 1000mm.

All columns are Dynamic Axial Compression (DAC) columns with pressure ratings up to 100bar and are fully CE or ASME certified.

Column slurry valves and cooling/heating jackets are available as an option.

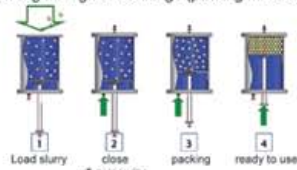
USP Class VI approved sealing material as well as ATEX approval (for use in explosion proof areas) are available as option.



LC column - cross section view

Packing of the columns can happen through the flanges or by means of slurry valves (inlet or outlet)

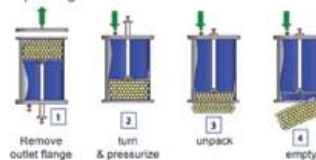
Column packing through outlet flange (packing mode against gravity)



Column packing with slurry inlet valve (packing mode with gravity)



Column unpacking



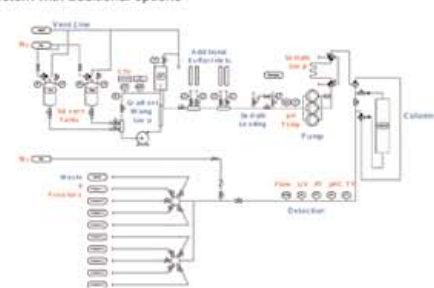
Pilot to production scale Peak Biotech equipment

The columns fit into a complete system which can be tailored to customer needs. The setup can range from a basic system up to a full option system

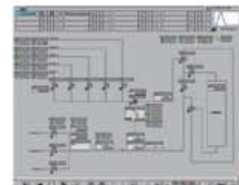
Specifications

- Flow rates 6 – 1000 l/h
- Pressure rates 0 - 80 bar
- Gradient loop with feedback for NIR, mass or conductivity
- 4 Buffer inlets, 1 product and 5 fractions
- Sealing material PTFE
- Material of construction 1.4404, 1.4435, SS316L

System with additional options



Systems are fully automated, CFR Part 11 and GAMP 4 compliant. Software is fully tested and validated and allows flexible control of the system.



Conclusions

- High performance Grace silica based media are available for non surpassed performance and selectivity resulting in high purity and yields (irregular and spherical).
- Durable high pressure Peak Biotech column hardware allows long term purifications.
- Flexibility allows easy and ergonomic handling of the pilot or production scale systems.

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