

## LC separations on pilot scale: Success criteria for packing quality

### How column packing influences the efficiency of the overall process

Glass chromatography columns for self-packing are often used for LC separations on a pilot scale. For a fast and successful separation, the efficiency of the packed column is essential. An important element of the process is suitable column hardware as the correct hardware can increase the column performance and the cost efficiency of the overall process. Easy and fast column packing is essential for the packing quality and therefore for an efficient process.

The aim of a LC process on a pilot scale is to purify as much product as possible in as short a time as possible as cheaply as possible. An optimum yield is achieved with a high column performance of the packed column.

This requires the column bed to be packed efficiently and homogeneously. The selection of suitable column hardware is an essential aspect of an optimized packing process. Moreover, packing, qualifying, and operating as well as unpacking the column all take time and reflect in the overall process costs.

An optimised column hardware offers possible savings by reducing the overall costs of the process.

During the design of the new YMC Pilot<sup>PLUS</sup>, YMC specifically focussed on the handling during the packing and unpacking steps. As a result packing procedures can be improved and the efficiency can be increased.

### Time is an important factor

When packing a chromatography column, different packing methods are available. No matter which packing method is chosen, time is always an important factor regarding the packing quality and efficiency of the overall process. If using the slurry packing method, it is important to initiate the packing process as quickly as possible.

If the time between pouring the slurry into the column and starting the pump is too long, the material will start to sediment. As a result, the bed is packed irregular with two different areas with different packing densities. This can affect the separation negatively and sedimentation effects cannot be corrected during the packing process.

### Air bubbles

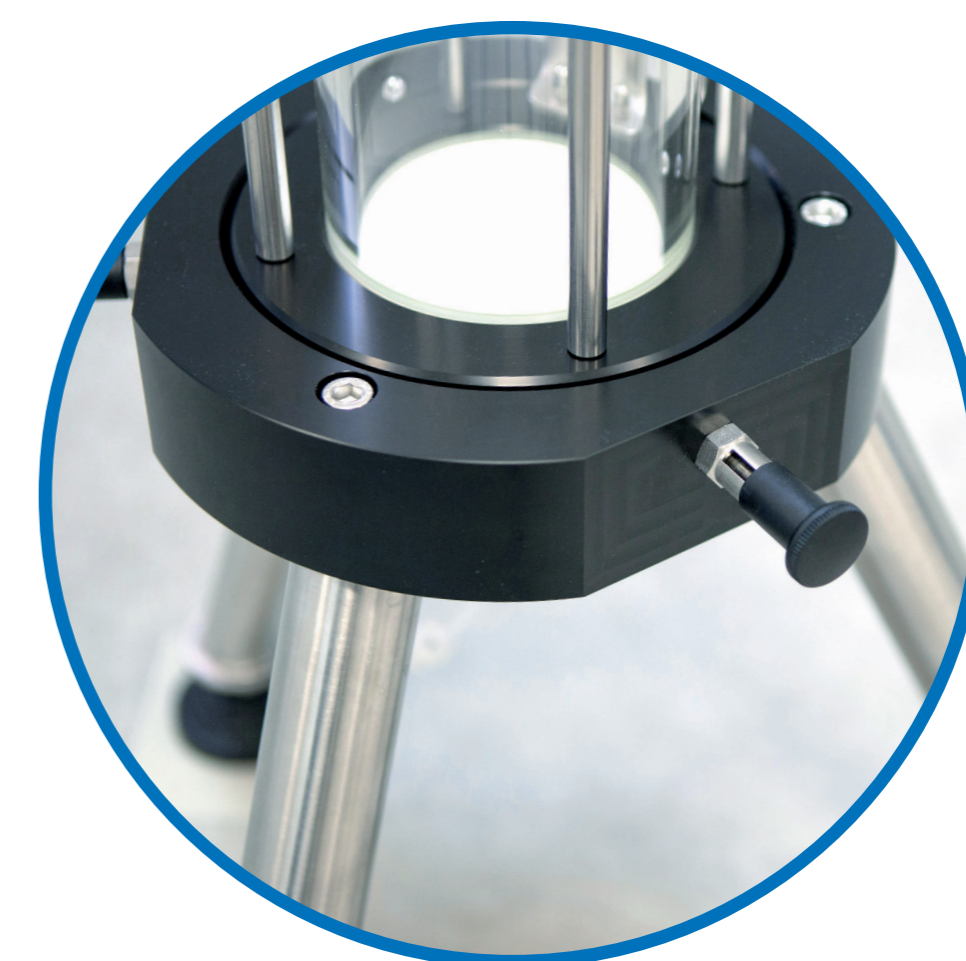
Next to time, air bubbles can seriously affect column efficiency. Air can enter the column during pouring of the slurry. Air can also be trapped below the frit during piston insertion and delays the start of the packing process.

Especially with column hardware where the piston is inserted vertically, air below the frit is noticeable. By moving the piston or loosening the O-ring, air bubbles can be removed partially. But this takes time and the packing process will start delayed.

### Pilot column for routine application

If columns in a process require be used routinely and packing material is changed often, safe and easy handling is of special interest. For an efficient overall process, not only the column packing but also the unpacking for routine applications must be fast.

The key to a fast packing and unpacking is a removable column body which is easy to unlock via three locking bolts and repositioning in the upside-down position. In addition to the easy unpacking step, the column body can be easily transported. This is beneficial especially for cleaning the column body.



### Special requirements for the column hardware

Glass pilot columns such as the YMC Pilot<sup>PLUS</sup> are mainly used for BioLC applications and packed with soft gels. This application area makes additional demands on the column hardware because compounds such as peptides, proteins, oligonucleotides or antibodies can have very complex three-dimensional structures. Metal ions can influence this structure and hence the stability and function of these biomolecules. Therefore, metal free wetted parts of the hardware is essential. For the use in production processes, all wetted parts need to be certified and documentable.

### Column hardware – a contribution to the efficiency of the overall process

As column packing is an essential step in processes where self-packing glass pilot columns are used, the column hardware contributes to the efficiency of the overall process. With the correctly selected pilot column, considerable time can be saved during column packing and the subsequent column unpacking. In addition, the appropriate column hardware will lead to an optimum packing quality and performance. This can be achieved through a successful packing process.

### Fast piston insertion without air bubbles

The new YMC Pilot<sup>PLUS</sup> is the solution for fast and bubble free piston insertion. Through an inclined surface at the glass body and the drain function, the piston can be inserted into the solvent. Excessive solvent can flow away through the drain function. For prevention of air bubbles during pouring in the slurry, a special column filling tool is available.

