Handling Self-Pack IntegraFrit™ Columns

Self-Pack IntegraFrit™ Columns are designed for customers custom-packing their own nanobore liquid chromatography columns. Self-Pack IntegraFrit Columns are 50cm-long 360 µm outer diameter (OD) fused-silica tubes with a porous, sintered glass frit at one end. The edge of the fused-silica tubing at the frit has been polished flat; the distal or back end of the fused-silica capillary is open and contains no frit (Figure 1). Depending on desired flow rate, Self-Pack IntegraFritTM Columns are available in 50 µm, 75 µm, 100 µm, and 150 µm inner diameters (IDs).

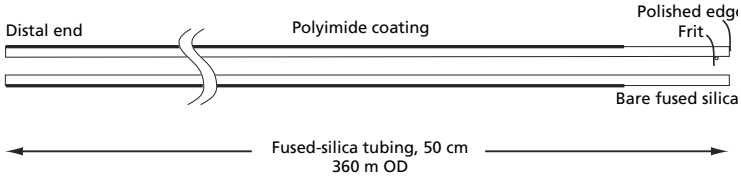

FIGURE 1 IntegraFrit™ Self-Pack Column prior to packing

Once packed, the chromatography bed extends from immediately behind the frit and terminates at a bed length of the user's designation (Figure 2).

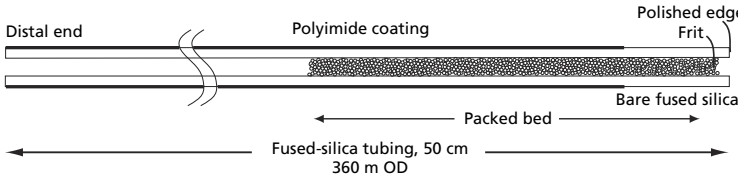

FIGURE 2 IntegraFrit™ Self-Pack Column packed

Packaging of Self-Pack IntegraFrit™ Columns

Self-Pack IntegraFrit™ Columns are packaged in a plastic box (Figure 3) with the delicate fritted ends threaded through an elevated plastic mounting block to avoid damage (Figure 4). An FEP sleeve surrounds the tubing emerging from the back of the mounting block and extends 25 cm over the length of the tubing; remaining fused-silica tubing is curled into a loop near the distal end of the IntegraFrit.

FIGURE 3

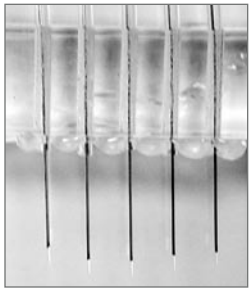

FIGURE 4

Guidelines for Handling Self-Pack IntegraFrit™ Columns

1). Never bend the clear FEP sleeve

2). Once packed with stationary phase by the user, mobile phase flow must always be directed towards the frit. Reversing the flow may result in partial or complete unpacking of the bed.

CAUTION: Handling fused-silica tubing can result in serious personal injury, including eye and skin injury. Use safety goggles meeting ANSI Z87.1-1989 requirements, or the equivalent. Puncture and chemical-resistant gloves should also be worn at all times.

Removing Self-Pack IntegraFrit™ Columns from Packaging

1). Apply a pair of forceps to a location about 2cm away from the fritted end.

2). Pull the column forward until the distal end slides out of the FEP tubing and out of the block (Figure 5).

WARNING: Do not touch the fritted end of the IntegraFrit column to any surface. It is extremely delicate and breaks easily.

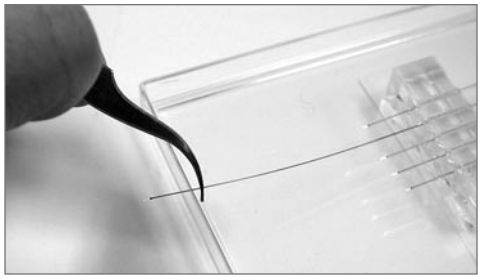

FIGURE 5 Removing Self-Pack IntegraFrit™ Columns from packaging

Cleaving Fused Silica

Proper cleaving of fused-silica tubing is a critical but often overlooked operation in the preparation of emitters and columns prior to use. A flat, smooth cleave is essential for maintaining low dead volume connections with other sections of fused-silica tubing. It is also critical that cleaving does not generate flow-stopping particulate matter. Cleaving is best accomplished with a high-quality diamond chip or sapphire cleaving tool. New Objective's 1 mm wide diamond-blade cleaving tool, shown in Figure 6, has been selected to provide a consistent, flat cleave with a minimum of particulate generation. Inexpensive carbide scribing tools are not recommended, since they generally result in poor-quality (i.e., ragged) cleaved end faces that generate many fine particles.

CAUTION: Handling of fused-silica tubing and emitters can result in serious personal injury, including skin and eye injury. Use safety glasses or goggles meeting ANSI Z87.1-1989 requirements or the equivalent. Puncture- and chemical-resistant gloves should be worn at all times.

Procedure

1. Place the tubing to be cut on a flat, clean surface and position the cleaving tool perpendicular to the tubing surface, as shown in Figures 7 & 8B. The long axis of the blade should be perpendicular to the tubing bore.
2. Press down gently (Figure 8B); DO NOT use a sawing motion when pressing the blade. You only need to nick the surface of the polyimide coating (Figure 8C). Be careful not to force the blade through the tubing, which will generate a ragged end and many particles (Figure 8D).
3. Pull gently on the tubing along its axis; it should easily separate at the point of contact. If it does not, repeat the procedure with a little more force. A typical cleave of 360 µm OD, 75 µm ID fused-silica tubing is shown in Figure 12. Residual surface irregularity is on average less than or equal to 10 µm.

Inspection of the distal end of the tip for particle contamination using a light microscope with transmitted light at 100x magnification is highly recommended. New Objective sells an accessory kit that contains all the high-quality tools (cleaver, special forceps, ruler, etc.) you will need to properly handle fused-silica emitters, columns, and tubing. Please see our catalog or Web site for a full description of our Micro Tool Kit (stock number TIP-KIT).

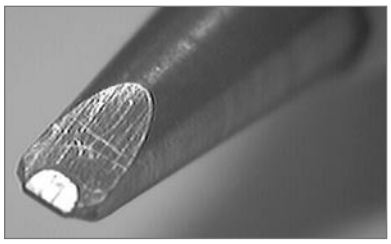

FIGURE 6 Close-up view of diamond-blade cleaving tool

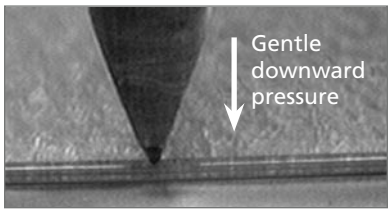

FIGURE 7 Cleaving tool in proper position

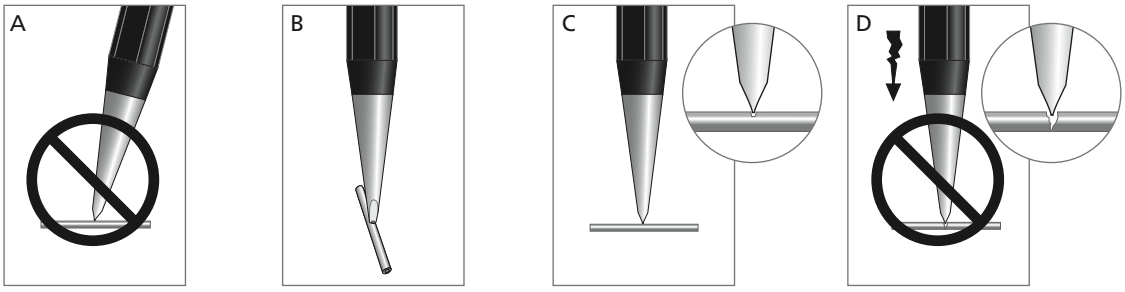

FIGURE 8 (A) Improper cutting angle (B) Align cleaving tool perpendicular to tubing (C) Press down gently, scoring tubing (D) Too much downward pressure will crush tubing, producing particles that can cause tubing to clog

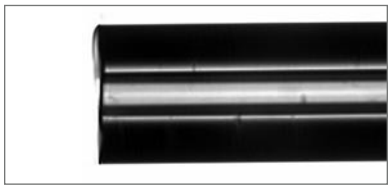

FIGURE 9 Typical cleave. Polyimide coating was removed after cleaving for clarity of image.