



## **The Wrench**

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### **Sample and Mobile phase filtering**

Instituting a preventative maintenance program, ensuring chemical compatibility amongst samples, solvents, and system components, examining buffer composition and concentration are all important aspects in keeping your HPLC system running optimally. There is another simple, easy and inexpensive precaution that can be taken that can help minimize instrument downtime, filtering your mobile phase phases and samples.

Filtering will help prevent blockages of tubing and frits. It can extend the lifetime of in-line filters. It can result in less wear and tear to the injection port, plungers, and seals. Finally, it may help improve chromatography by removing contaminants.

### **Sample filtering**

Passing the sample through a syringe tip filter is the most common way to clean up a sample. When choosing a filter there are a number of material choices available. It is important to choose a filter with the proper physical characteristics required for your analysis and is made of material compatible with your sample and solvent. Figure 1 shows a typical syringe filter.

Figure 1.



Syringe filters are composed of 3 wetted parts; a housing, the filter membrane, and a pre-filter. Housings are predominately made of a polypropylene material. The filter membranes can be made of a variety of materials including Cellulose Acetate, Regenerated Cellulose (RC), Nylon, Polypropylene, PTFE, and PVDF. The pre-filter is typically comprised of either polypropylene, polyether sulfone, or glass.

PTFE is a hydrophobic material that has the widest range of solvent compatibilities including aqueous and organic solvents as well as acids and bases. Nylon is hydrophilic and is compatible with most aqueous and organic solutions, however it is not compatible with many acids or bases. Regenerated Cellulose is a hydrophilic material that is also compatible with organic and aqueous solutions, and has the added benefit of exhibiting low protein binding.

Beyond the chemical characteristics of the filter, the physical characteristics must be considered as well. Pore size, membrane thickness, burst strength, and extractables are other characteristics to account for. Typical HPLC applications should be filtered through a 0.45 $\mu$ m filter, a 0.2 $\mu$ m filter may be necessary if there is the need to remove bacterial growth. 13mm diameter filters can handle sample volumes ranging from 1 to 10mL and are suitable for most HPLC samples.

### **Mobile Phase filtering**

Similarly, filtering mobile phases will benefit the HPLC system and the column. This is especially true in the case of mobile phases prepared with buffers and should be standard practice in these cases.

Filtering is done off-line, prior to pouring the mobile phase into the solvent reservoir. Typically, the mobile phase is vacuum filtered; either a 0.2 $\mu$ m or 0.45 $\mu$ m filter disc membrane is used (again depending on whether or not there is the need to eliminate microbial growth). The same precautions or awareness must be taken with choosing the membrane filter material as was outlined for the sample filters above.

The typical filter set up is pictures below in Figure 2. It comprises a vacuum flask with a ground glass opening, a fritted glass support base, a filter membrane (typically 47mm in diameter), a clamp, and a funnel.

Figure 2.



By taking the time to introduce these simple additions to sample and mobile phase preparation you can help ensure the reproducibility and quality of your sample results, and minimize unplanned downtime of your HPLC.

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