

## Water Filters Slowly Through PTFE Membranes – HPLC Primer

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### Overview

PTFE (polytetrafluoroethylene) membranes are well-known for their excellent chemical resistance and suitability for aggressive organic solvents. However, these same characteristics make PTFE poorly suited for aqueous filtration.

Understanding why water performs poorly through PTFE helps analysts select the correct membrane for efficient and reliable sample preparation.

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### Why PTFE Filters Water Slowly

PTFE is one of the most hydrophobic polymers used in filtration. Its surface strongly repels water due to:

- Extremely low surface energy
- Non-polar chemical structure
- Inability of water molecules to wet or penetrate the membrane pores

Because water cannot readily wet the surface, the membrane tends to trap air inside its pores. This results in:

- Very slow flow rates
- High back pressure
- Difficulty initiating filtration
- In some cases, complete refusal to filter water

Even with significant pressure applied, the flow remains inefficient.

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### Hydrophilic Membranes Perform Better for Water-Based Samples

For aqueous sample preparation—including HPLC, dissolution testing, and routine buffer filtration—hydrophilic membranes perform far better. Recommended alternatives include:

#### 1. Hydrophilic Nylon

- Naturally hydrophilic
- Strong and durable
- Excellent for water and aqueous buffers
- Low extractables

Nylon is one of the most common choices for aqueous HPLC samples.

#### 2. PES (Polyethersulfone)

- Highly hydrophilic
- Very low extractables
- Fast flow rates
- Ideal for biological or complex aqueous matrices

PES is often preferred when exceptionally clean filtration is required.

### 3. Cellulose Acetate (CA) or Other Hydrophilic Polymers

These may be used depending on sample chemistry, pH, and specific application requirements.

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#### When to Use PTFE

PTFE remains the membrane of choice when filtering:

- Strong organic solvents
- Corrosive acids (in non-aqueous systems)
- Aggressive chemical mixtures
- High-pH or reactive compounds where membrane robustness is essential

However, for water-based samples, PTFE **should be avoided** unless pre-wetting with an alcohol is allowed—which is not recommended for most analytical workflows due to contamination risks.

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#### AQ™ Syringe Filter Resources

For ordering information, chemical compatibility tables, and membrane selection guidance:

- Click [HERE](#) for filter membrane ordering information and pictures.

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