Simplifying Progress

Laboratory Ultrafiltration: Product Qualification Guide

How to choose the best device for each lab ultrafiltration application

The guide below is designed to help ultrafiltration process developers, researchers, lab managers and any other end users, select the best Sartorius product range for their application. It focuses on the three critical aspects of selection: target type, target size and sample volume, whilst also highlighting what product range may be suitable for typical sample treatment and control processes, such as for sensitive samples and how to define a final concentrate volume.

Some examples are also provided. It should be noted that this guide is based upon typical ultrafiltration models. Due to the variations within protein, membrane and inorganic chemistry, etc., we always recommend testing with sample devices prior to establishing a method.

<table>
<thead>
<tr>
<th>Target Size</th>
<th>Sample Volume</th>
<th>Ultrafiltration Method</th>
<th>Key Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 kDa</td>
<td>0.1 – 2.5 mL</td>
<td>Centrifugal, stationary</td>
<td>One or more</td>
</tr>
<tr>
<td>10 – 30 kDa</td>
<td>2.5 – 20 mL</td>
<td>Centrifugal, stationary</td>
<td>One or more</td>
</tr>
<tr>
<td>30 – 150 kDa</td>
<td>20 – 100 mL</td>
<td>Centrifugal, stationary</td>
<td>One or more</td>
</tr>
<tr>
<td>150 – 500 kDa</td>
<td>50 – 5000 mL</td>
<td>Centrifugal, stationary</td>
<td>One or more</td>
</tr>
</tbody>
</table>

How to use this guide:

- **Sample Parameter**
  - Membrane (MCWOs) Method: Product Application  
  - Typical Recommendation

**Target Type**

- **Protein (neutral or negatively charged)**
  - Membranes: Vertical Membrane  
  - Products Available: Vivaspin® 500, Vivaspin® 2, 6, 20, Vivaspin® Turbo 4 & 15 PES, Vivavflow® 100, Vivavflow® 50 & 200

- **Protein (positively charged)**
  - Membranes: Vertical Membrane  
  - Products Available: Vivavflow® 100 K, Vivavflow® 500, 50K, 50R & 200

- **Viruses**
  - Membranes: Vertical Membrane  
  - Products Available: Vivaspin® 500, Vivaspin® 2, 6, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivavflow® 100, Vivavflow® 50, 50R & 200

- **Extracellular Vesicles**
  - Membranes: Horizontal Membrane  
  - Products Available: Centrisart® Vivacell® 50, 50R & 200

- **DNA | RNA**
  - Membranes: Vertical Membrane  
  - Products Available: Vivaspin® 500, Vivaspin® 2, 6, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell® 100, Vivavflow® 50, 50R & 200

- **Inorganics**
  - Membranes: Vertical Membrane  
  - Products Available: Vivaspin® 500, Vivaspin® 2, 6, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell® 100, Vivavflow® 50, 50R & 200

**Buffer Exchange**

- Key Points: To maintain buffer balance, de-salt, prevent precipitation, to replace with different buffer. Diafiltration allows for simultaneous buffer exchange and concentration.

- Process Available: Diafiltration cup with Vivaspin® 20, diafiltration reservoir with Vivaspin® 50, 50R & 200

- Application Note: TBA

**Low Concentrations**

- Key Points: Samples with low concentration rely on near 100% recovery, providing non-specific absorption is key for this application. Pulsation through stirring with non-interfering protein and buffer solutions (e.g., BSA, Tween 20, SD) available with all products.

- Application Note: TBA

**Depyrogenation**


- Application Note: TBA

**Device Sanitization**

- Key Points: Varying speeds of concentration make it hard to judge time to reach a final volume. Process Available: Pre-wash the filtration tube limits the volume of concentration, thereby defining the final concentrated volume. Available to all centrifugal concentration products.

- Application Note: TBA

**Final Volume**

- Key Points: Changing membrane pressures can incur shear stress and degrade sensitive biomolecular targets. Process Available: Pressure control and TFF ultrafiltration methods achieve stable membrane pressure and flux compared to centrifugal. Available in Vivacell® & Vivavflow® products

- Application Note: TBA

**Sensitive Samples**

- Key Points: Changing membrane pressures can incur shear stress and degrade sensitive biomolecular targets. Process Available: Pressure control and TFF ultrafiltration methods achieve stable membrane pressure and flux compared to centrifugal. Available in Vivacell® & Vivavflow® products

- Application Note: TBA

**Example Applications**

1. **Monoclonal Antibodies**
   - Application: Concentration for purification Target Type: IgG1, IgG2a, IgG2b, IgG3 Target Size: 150 kDa Sample Volume: 3 L Product Used: 30K PES Vivavflow® 200

2. **Bence Jones Proteins**
   - Application: Concentration for urine protein electrophoresis and sample diagnosis Target Type: Monoclonal Fc (IgG) Target Size: > 20 kDa Sample Volume: 10 mL Product Used: 10X PES Vivaspin® 20 Treatment and Control Processes: Buffer exchange for sample de-salting

3. **Lentivirus**
   - Application: Polishing after AEX chromatography Target Type: Lentivirus viral vector Target Size: > 500 nm Sample Volume: 20 mL Product Used: 100X PES Vivaspin® 20 Treatment and Control Processes: Desalting in parallel concentration with diafiltration cup

4. **DNA PCR Primers**
   - Application: Conc. of target primers and removal of interfering short bp primers Target Type: dNTPs Target Size: 300 bp Sample Volume: 1800 uL Product Used: 30X PEG Vivaspin® 2 Treatment and Control Processes: Result: Near total removal (> 95%) of primer DNA and linear total retention of 300 bp molecules, within a 20 min spin time and a total 40 min procedure time

*For conversion from diameter, base pair length, other dimensions to equivalent Molecular Weight please refer to the Sartorius Lab Ultrafiltration Selection Guide

Find further details of all tips, tricks, applications and products by contacting your local Sartorius representative. www.sartorius.com