Filtration Selection Guide

Selecting a Filter

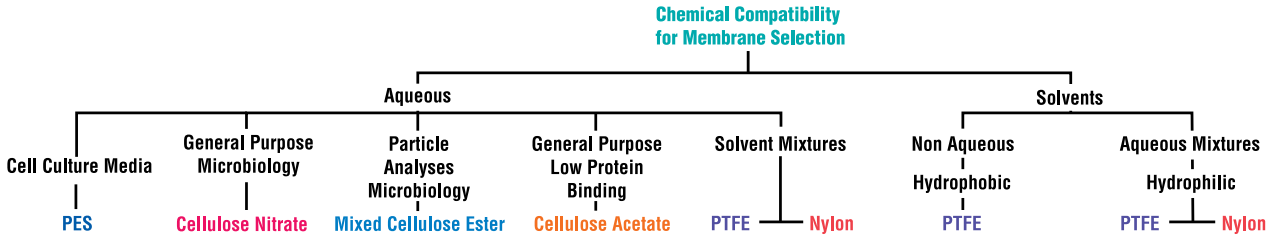
1. Determine the particle size to be retained or filtered. Membranes will retain all particles equal to, and larger than their designated pore size.
2. Assess the chemical compatibility of the membrane filter with the liquid or gas to be filtered. Consider the chemical resistance properties of all the parts that will contact the filtrate.
3. Depending on the procedure performed, the membrane color or surface pattern may be important.
4. Also consider hydrophilic or hydrophobic membranes, temperature, flow rate, throughput, and sterilization needs.

Filtration Types

Use this guide to determine the optimal type of filtration for your particle sizes. Each type of filtration is designed to separate differing ranges of microparticles and particles:

Ultrafiltration is best with particles of roughly 10,000 to 1,000,000 MW. **Microfiltration** is best with particle sizes of roughly 0.1 to 10 µm. **Macrofiltration** is best with particle sizes greater than 50 µm.

Type of filtration	Ultrafiltration	Microfiltration	Macrofiltration
Units	Dalton (MW)	Microns (µm)	50 µm or greater, visible to the human eye
Particle examples and sizes	Trypsin (24,000) Serum albumin (67,000) Gamma globulin (169,000) Viruses (600,000 to 30,000) Endotoxins (500,000 to 12,000)	Mycoplasm (0.08 to 0.4) Proteins (0.0005 to 0.5) Fungi (0.7 to 3) Yeasts (0.6 to 4) Bacteria (0.3 to 12)	Spores Pollen Human hair Sands



Membrane Materials

Cellulose Nitrate (CN) membrane is the most popular membrane used in analytical and laboratory filtration. CN membrane has excellent wetting properties and gives fastest flow rates with aqueous solutions.

Cellulose Acetate membrane is a mixture of cellulose triacetate and diacetate that creates a strong membrane in both lateral and longitudinal directions. In addition, the membrane has a low static charge, a very low aqueous extractability, and good solvent resistance to low molecular weight alcohols.

Mixed Cellulose Ester membrane provides a more uniform and smoother surface compared to pure nitrocellulose membrane. This membrane is typically used to count or analyze particles contained in liquids or captured from aerosols.

Nylon membrane is strong, inherently hydrophilic, and compatible with a broad range of aqueous solutions including alcohols and solvents used in HPLC work.

Polyethersulfone (PES) membrane is hydrophilic and low protein binding. No external wetting agents are required, resulting in low extractables. PES membrane generally offers fast flow rate and better chemical resistance than cellulose acetate membranes.

PTFE membrane is strong, highly porous, and inert to most chemically aggressive solvents, strong acids, and bases. Chemical and thermal limitations are imposed by the backing material.

Terms to Know

Bubble Point: the amount of air pressure that is required to force liquid from the largest wetted pore of the membrane.

Hydrophilic: or "water-loving", refers to a filter's ability to naturally absorb water.

Hydrophobic: or "water-hating", refers to a filter's ability to naturally repel water.

Molecular Weight Cut Off (MWCO): lowest molecular weight solute that is 90% retained by the membrane. For rapid filtration where some sample loss is acceptable, a membrane with MWCO the same as the molecular weight of the solute can be used. When loss of material of interest is undesirable, the membrane MWCO should be less than the molecular weight of the compound.

Pore Size (absolute): the point at which a particle of defined size will be retained with 100% efficiency under specified conditions.

Prewet: membranes that are inherently hydrophobic need to be specially wetted before use with aqueous filtrations. This can be done by using approximately 5 mL of chromatography-grade methanol, acetone, or compatible fluid with low viscosity (>0.6 cp) and rinsing with approximately 25 mL of water.

Throughput: refers to dirt handling capacity before membrane clogs.