Simplifying Progress

Laboratory Ultrafiltration
How to Choose the Optimal Device & Method

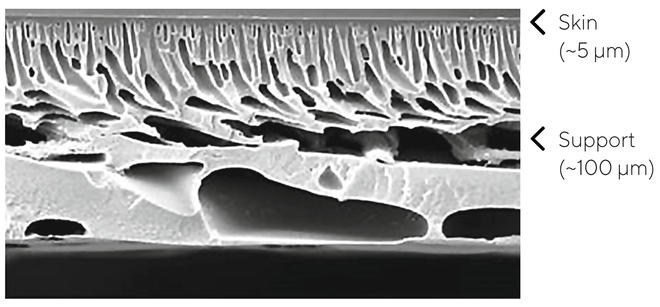
Selection Guide for proteins, viruses, DNA, polymers, nanoparticles, exosomes, etc.

1. Consider Sample | Molecular Properties

Molecule shape	linear molecules respond concentrate better with lower g-force
pH and salt conditions	may cause aggregation and conformational changes
Temperature	lower temperatures reduce concentration rates
Sample fractionation	can only be done with a 10x molecular weight difference
Aggregation and rearrangement properties	may affect particle size distribution
Non-specific binding	test what membrane is best for what macromolecule to avoid unnecessary loss

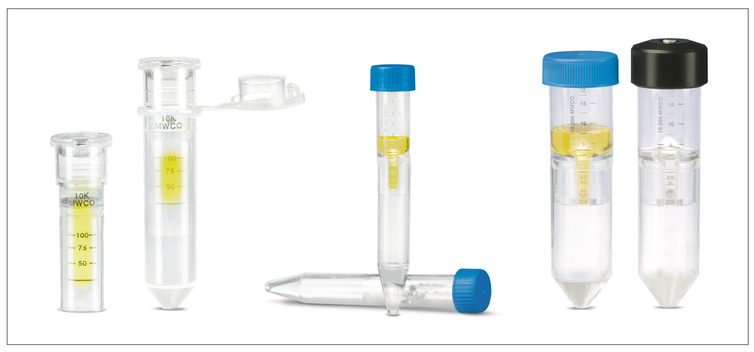
Ultrafilter cross section SEM
Showing the membrane skin and separate membrane support

Membrane Options:
1. Cellulose Triacetate
2. Polyethersulfone
3. Regenerated Cellulose
4. Hydrosart®



2. Select the Right Device

Centrisart®
0.1 – 2.5 ml
Higher binding, good for cleaner filtrates

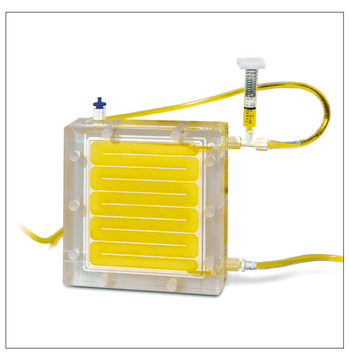


Vivaspin® 500, 6, 20
0.1 – 20 ml
High membrane surface areas, simultaneous buffer exchange with VS 20, good for core applications

Vivaspin® 2
0.4 – 2 ml
Reverse spin enabled, good for low concentrations

Vivaspin® Turbo
2 – 15 ml
Fastest spin times, dead stops, good for recovery

Vivacell 100
20 – 100 ml
Centrifuge or pressure based, good for mid range volumes



Vivaflow®
100 – 5000 ml
Plug and play crossflow | TFF, good for quick, simple, concentration at high volumes

Vivacon®
0.1 - 2 ml
PCR grade available, good for dilute samples and DNA targets

3. Select the Right Molecular Weight Cut Off (MWCO)

- MWCO should be close to ⅓ the target molecular weight
- Lower MWCOs may increase recovery, but reduce speed
- Higher MWCOs have greater surface to molecule interaction area and may bind more
- Use reverse centrifugation devices (Vivaspin® 2) to maximize recoveries

MWCO	Protein MW	Molecule Size	BPCO (dsDNA)	BPCO (ssDNA)	Estimated Pore Size
1,000 K	>3000 kDa	300 – 600 nm	>5000 bp	>9000 sb	100 nm
300 K	900 – 1800 kDa	90 – 200 nm	>1500 bp	>2900 sb	30 nm
100 K	300 – 900 kDa	30 – 90 nm	>600 bp	>900 sb	10 nm
50 K	150 – 300 kDa	15 – 30 nm	>300 bp	>475 sb	7 nm
30 K	90 – 180 kDa	9 – 15 nm	>50 bp	>275 sb	4 nm
10 K	30 – 90 kDa	5 – 9 nm	>30 bp	>90 sb	2.5 nm
5 K	15 – 30 kDa	3 – 5 nm	>20 bp	>50 sb	1.5 nm
3 K	10 – 20 kDa	2.5 – 3.6 nm	>15 bp	>30 sb	1.2 nm
2 K	3 – 10 kDa	2 – 3 nm	>10 bp	>10 sb	1 nm

4. Select the Right Device Treatment Method

- For low starting concentrations pretreat devices with blocking solution to negate non specific absorption
- Pre-rinsing can remove analytes, such as glycerin, that are used to increase membrane stability, but devices must be used immediately after pre-use
- Devices are listed as single use and performance may drop if re-used

5. Select the Right Sample Control Method

- Buffer exchange in parallel to concentration with diafiltration caps and reservoirs
- Recover maximum concentrate with angular dead stop devices and the correct pipette tips
- Control your final sample volumes by prefilling the filtrate vessel
- For sensitive protein targets try using pressurization based devices, keeping a constant pressure ensures a stable flux rate and reduces shear stress on the target
- Flushing through with 70% ethanol will “clean” the devices and will minimise sample contamination
- Vivaspin® devices can be sterilized using ETO gas serialization methods, to further ensure no contamination

Did You Know?

- Sartorius offer FOC samples for testing, to ensure you’re always using the optimal device
- Sartorius offers diafiltration caps with the Vivaspin® 20 devices
- If using for In Vitro Diagnostics, you must use IVD certified devices
- Vivaspin® Angular Deadstop – Capture every last microliter

Find it at **fishersci.eu**

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