

# NEWS on diagnostics

2020 Volume 1

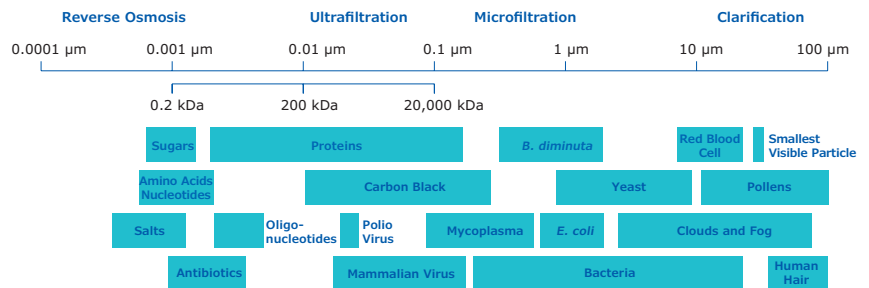


## Welcome to Volume 1 of News on Diagnostics

### Highlights of this edition:

- Microfiltration and Ultrafiltration
- Stericup® & Steritop® filter units
- Multiscreen® plates
- ELISpot
- Amicon® Ultra / Centrifugation
- Amicon® stirred cells

This issue focuses on filtration for everything from clarification to sterilisation of solutions (e.g. media preparation prior to cell culture), cell culture growth, and the concentration of proteins and small particles.



#### Reverse Osmosis (ionic separation)

Separates ions or molecules using a semipermeable membrane or barrier. Applied pressure overcomes osmotic pressure and forces solvent to move from a high solute concentration to a low solute concentration

Rejects a high percentage of organic matter, other particulates and >99% of salts

Typical rating is based on sodium chloride retention: ≤0.001 µm (<100 Daltons)

#### Ultrafiltration (macromolecule separation)

Separate particles and dissolved molecules from fluids based on particle size

Used for concentration, fractionation, desalting and buffer exchange

Carried out in pressure-driven, vacuum-driven, or centrifugal devices

Typical rating: 0.001 – 0.05µm (1-1000kDa Nominal Molecular Weight Limit [NMWL])

#### Microfiltration

(particle retention/exclusion & sterilisation)

Separates/removes particles (both rigid and deformable types) and biological entities – such as bacteria and cells – based on particle size

Carried out in syringe, multi-well plates, filter units, or disc filters

Typical rating: 09025 – 10 µm; and rated as nominal (~98% retention) or absolute (100% retention of the size equal to the pore size rating)

#### Clarification Filters (prefiltration, particle analysis)

Retains/removes large particles, aggregates, and debris based on size

May serve as a primary filtration step before microfiltration

Carried out in syringe filters, multi-well plates or disc filters

Typical rating: > 5µm

## Microfiltration and Ultrafiltration

There are similarities between both techniques:

- Both involve separating particles and from liquids / gases.
- A 'driving force' is required for the liquid/gas to pass through the membrane.
- Driving forces can be:
  - Centrifugal
  - Vacuum
  - Pressure

But also, some differences:

- Microscale particles are removed through microfiltration (Absolute Retention).
- Nanoscale particles are removed through ultrafiltration (Nominal Retention).

- Microfiltration membranes are categorised by membrane pore size.
- Ultrafiltration membranes are categorised according to the size of the particle they retain.

### Factors to consider for microfiltration

Sample characteristics	Fouling characteristics	Cross flow
Throughput & flow rates	Prefiltration	Agitation
Membrane pore size	Membrane support	Flow rate and filter life
Membrane wettability	Backwashing	Scale of filtration system

We have a wide variety of membranes for both microfiltration and ultrafiltration applications, at lab and process scales.

Find out more at [SigmaAldrich.com/](http://SigmaAldrich.com/)

## We have a range of microfiltration systems for clarification and sterilization with volumes from 1 mL to 20 L:

### Sterile filtration for all scales

**Media volume** →

1 mL    10 mL    50 mL    100 - 200 mL    150 ml - 1 L    2 - 10 L

Vacuum driven

**Media volume** →

1 mL    10 mL    50 mL    100 - 200 mL    <2 L    2 - 20 L

Pressure driven

### Stericup® & Steritop® filter units

Stericup® and Steritop® sterile filtration devices combine superior flow rates and throughput with low non-specific binding and a stable, no-tip design.

### Fast flow, low-binding membranes

Membranes with low protein binding ensure that key growth factors and proteins won't be absorbed into the filter. Millipore Express® PLUS membranes feature low protein binding and faster flow than other membranes. For applications that require ultra-low protein binding, use a device with Durapore® PVDF membrane.

Explore the full line of Stericup® filter units and applications at [SigmaAldrich.com/stericup](http://SigmaAldrich.com/stericup)

### Refined with you in mind

The Stericap® vacuum filtration system can process and store volumes from 150 mL to 1 L. The new, no-tip/easy-grip flask design and compact profile improve stability during filtration and make Stericap® filter units ideal for use in laminar flow hoods. As an added convenience, the bottom of the receiver flask is slightly recessed, enabling capped flasks to be stacked for easy storage.

### Applications

- Tissue culture media +/- additives
- Buffers
- Biological solutions



**Millipore®**

Preparation, Separation, Filtration & Monitoring Products

**Merck also offers microfiltration devices, in a microplate format especially suitable for cell growth or ELISpot applications:**

**Millicell®: Microporous Membrane-Based Cell Culture for Cell Growth**

Millicell® products promote natural cell growth and incorporate unique design features to improve flexibility in today’s laboratories. Unlike cells grown on plastic plates, membrane-supported cell cultures can access media from both their apical and basolateral sides, resulting in cell morphology that mimics cells grown *in vivo*.

See all Millicell® plates:  
[SigmaAldrich.com/catalog](http://SigmaAldrich.com/catalog)



**Multiscreen® plates**

No matter what application you’re working with, Merck has a plate developed to meet your specific needs. MultiScreen® plates have a long history as a reliable tool for the advancement of drug discovery, life science research and ELISpot applications.

See all MultiScreen® plate specifications  
[SigmaAldrich.com](http://SigmaAldrich.com)



**ELISpot**

Developed in 1983, the ELISpot assay represents the convergence of plate-based Enzyme Linked

Immunosorbent Assays (ELISAs) with membrane-based western blotting technologies, permitting detection of secreted analytes at the single cell level.

Membranes offer vastly improved binding characteristics over standard polystyrene surfaces.

While many options exist, most ELISpots are currently performed on polyvinylidene fluoride (PVDF) membrane plates. Binding of capture antibody is governed by hydrophobic interactions between

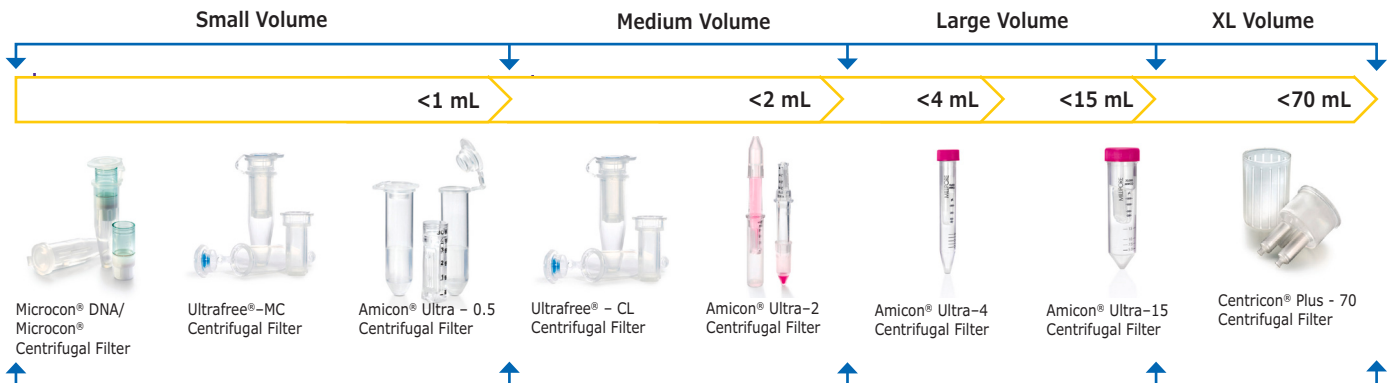
amino acids such as phenylalanine or leucine and PVDF; this association is much stronger than the electrostatic interactions at nitrocellulose surfaces.

Stronger binding interactions translate to greater antibody density on the membrane’s surface, resulting in better-defined spots. Because the readout for an ELISpot is “spots/well”, the PVDF membrane’s white color provides the ideal backdrop.

Learn more about ELISpot assays, their applications and validation at [SigmaAldrich.com/elispot](http://SigmaAldrich.com/elispot)

**Ultrafiltration is often the method of choice to separate compounds such as proteins (antibodies for example), viruses, and nucleic acids.**

Merck has a broad variety of devices working with centrifugation or pressurization.



## Amicon® Ultra / Centrifugation

Our Amicon® Ultra 4 and 15 are IVD registered and can be used in diagnostic applications such as the Bence & Jones Test:

- Bence Jones protein (BJP) urine test is used to diagnose a type of blood cancer – multiple myeloma.
- Multiple myeloma – happens when plasma cells which make antibodies start uncontrolled multiplication, releasing Bence Jones protein.
- BJP is also linked to cancers of the lymphatic system (lymphoma, Waldenstrom macroglobulinemia).
- Levels of BJP in urine are used to diagnose and monitor the stage of cancer and to inform treatment options.

	Existing Catalog number/future non-IVD Cat. No.	New registered for IVD-use Cat. No.
Amicon® Ultra-4 centrifugal filter unit, 10kDa, 8pk	UFC801008	UFC801008D
Amicon® Ultra-4 centrifugal filter unit, 10kDa, 24pk	UFC801024	UFC801024D
Amicon® Ultra-4 centrifugal filter unit, 10kDa, 96pk	UFC801096	UFC801096D
Amicon® Ultra-15 centrifugal filter unit, 10kDa, 8pk	UFC901008	UFC901008D
Amicon® Ultra-15 centrifugal filter unit, 10kDa, 24pk	UFC901024	UFC901024D
Amicon® Ultra-15 centrifugal filter unit, 10kDa, 96pk	UFC901096	UFC901096D

Find your Amicon® Ultra filter [SigmaAldrich.com/labware](https://www.sigmaaldrich.com/labware)

## Millipore®

The Millipore® portfolio of Merck offers an ecosystem of industry-leading products and services, spanning preparation, separation, filtration and monitoring – all of which are deeply rooted in quality, reliability and timetested processes. Our proven products, regulatory and application expertise are a strong foundation you can rely on to consistently perform at the highest level.



## Amicon® stirred cells

You're adept at finely separating macrosolutes in large-volume (50-400 mL) samples, and you depend on the precision of Amicon® devices. Or maybe you are an expert in membrane analysis, and you count on a device that lets you insert membranes of your choice. With your needs in mind, Merck has developed the reusable Amicon® stirred cell, providing the same gentle, high recovery of macrosolutes and thorough buffer exchange to which you're well accustomed. It also provides the same membrane flexibility and ability to monitor filtration progress.

Learn more about Amicon® stirred cell technology and applications at [SigmaAldrich.com/life-science](https://www.sigmaaldrich.com/life-science)

**In addition to our finished devices for microfiltration and ultrafiltration, Merck offers membranes in roll format that are suitable for your own custom designed devices.**

We have an extensive range of microfiltration hydrophilic, hydrophobic, superphobic and ultrafiltration membranes that deliver consistency, reliability, convenience, and choice to customers in industrial, medical device, pharmaceutical, and IVD manufacturing. We provide a complete solution for your membrane needs, with highly characterized, customizable membranes and exceptional long-standing technical support and industry specific regulatory expertise.

