

Sparkling Wine

Filtration Options

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Scott Laboratories



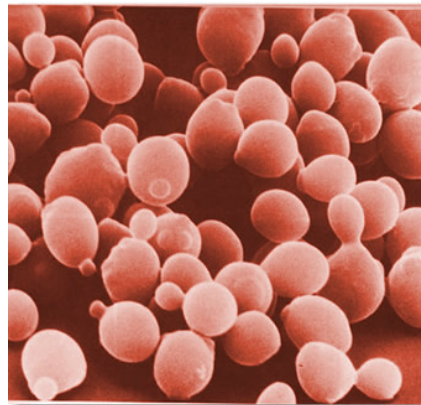


Filtration Goals

-Clarity



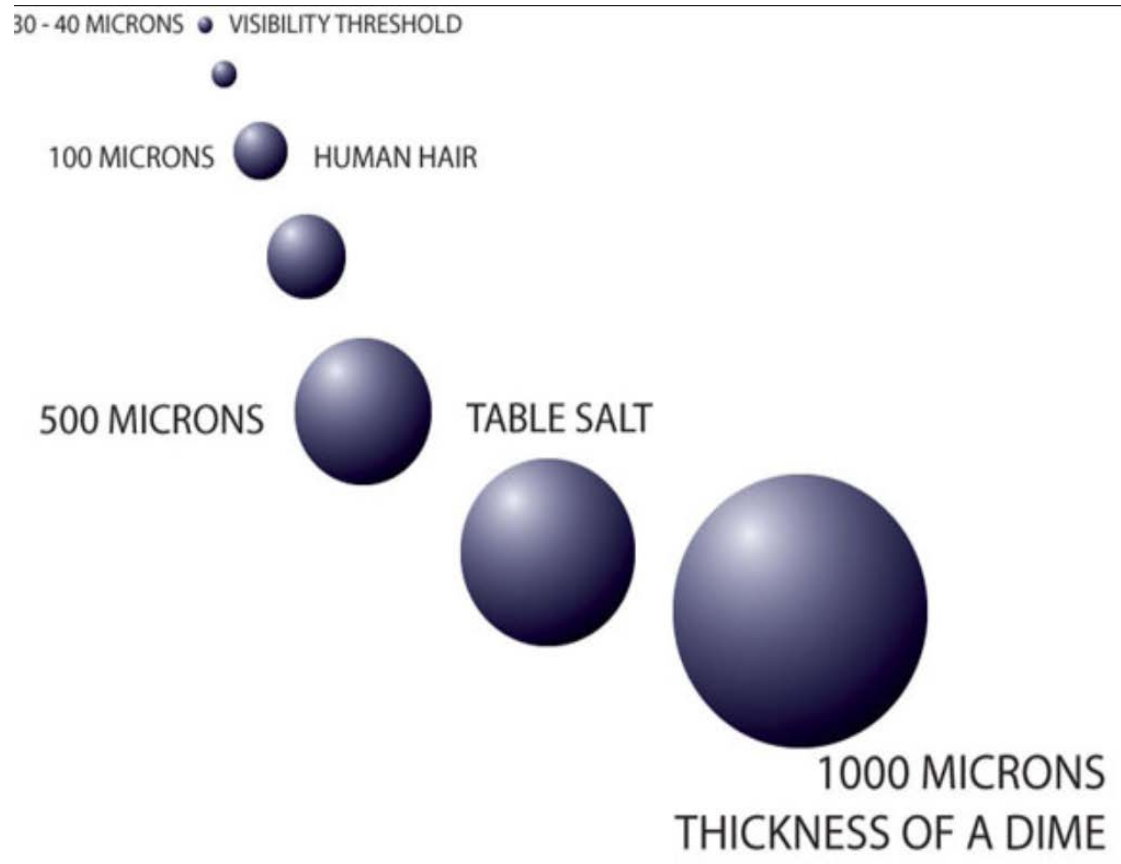
-Stability



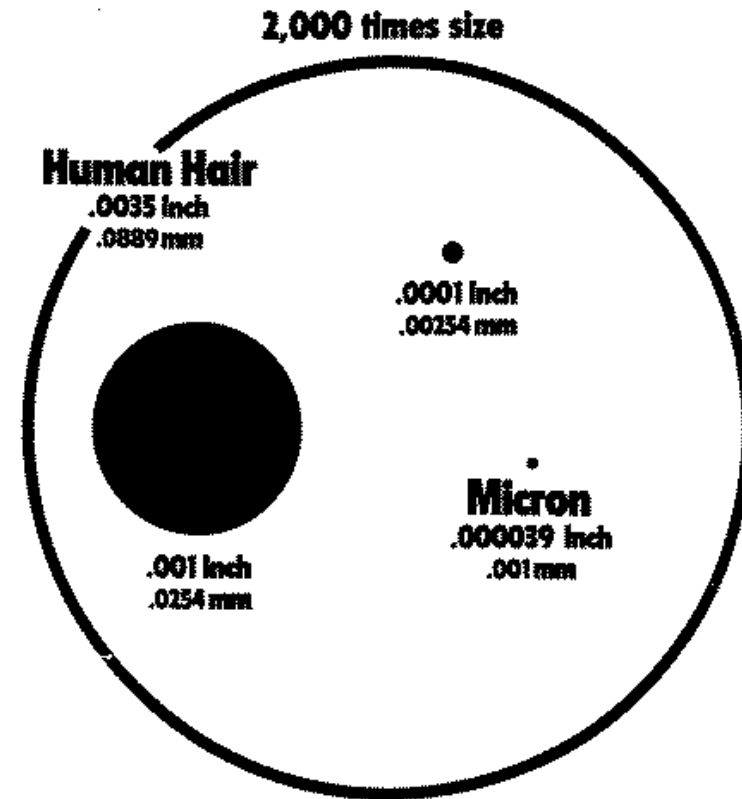
-Efficiency



Micron or μm



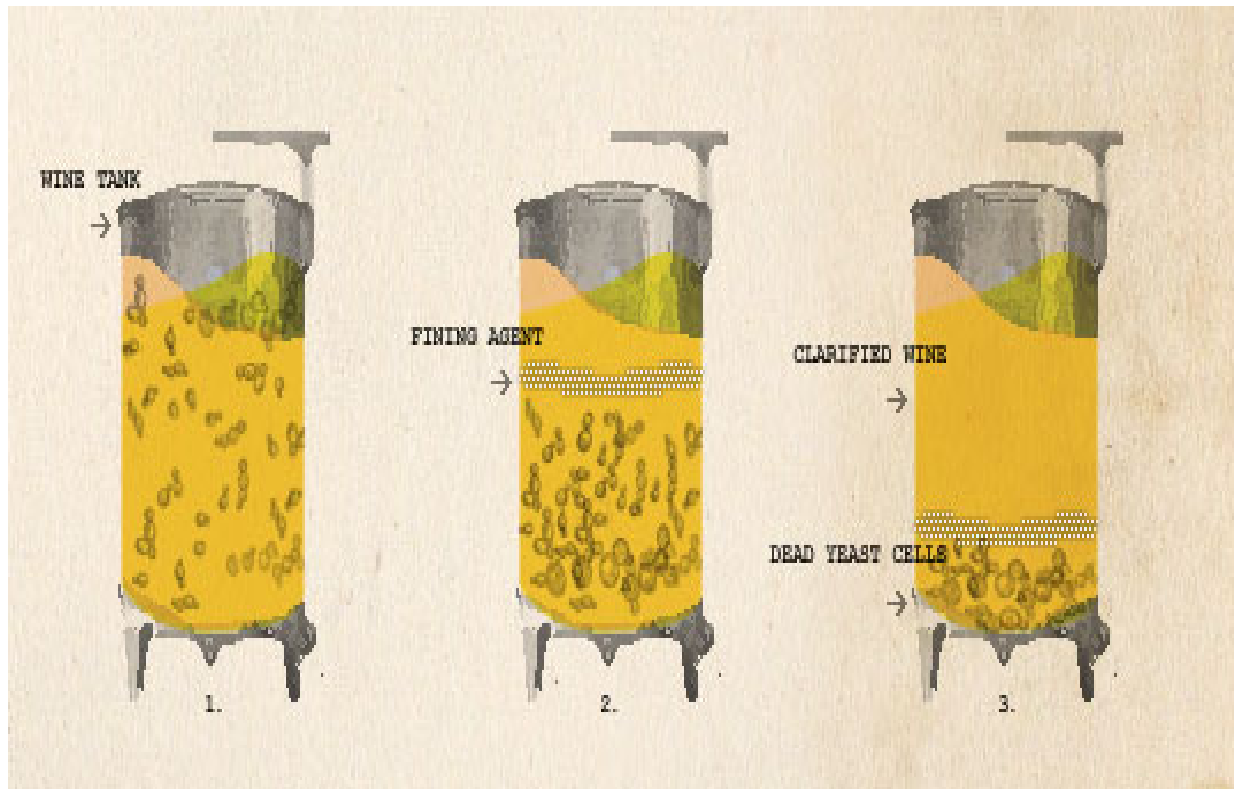
How big is a Micron?



Suspended Solids

- Grape pulp – 20 to 200 micron, gelatinous
- Tartrate crystals – 5 to 500 micron, rigid
- Protein precipitates – 2 to 20 micron, gelatinous
- Yeast – 1 to 2 micron, gelatinous
- Bacteria – 0.5 to 0.8 micron

Clarification and Stabilization



Fining agents
Temperature
Gravity
Racking
Flotation

Rough, Polish and Sterile

ROUGH	POLISH	STERILE/SANITIZING
Greater than 5 micron	Between 1-5 micron	Less than 1 micron
-Turbidity reduction -Excessively cloudy -Visible solids removal -Heavy Yeast removal	-Brightness -Final clarity -Yeast Population reduction	-Brilliance -Yeast “sterility” -Bacteria log reduction or “sterility”
DE: 1 Darcy Lenticular & Pads: K700 and up Cartridges: Polypropylene	DE: 0.3-0.4 Darcy Lenticular & Pads: K100 through K300 Cartridges: Glass or PP	DE: 0.1-0.2 Darcy Lenticular & Pads: EKS through KS80 Cartridges: PES, CA, PVDF

HUMAN HAIR: 55 μ

Common PVPP: 25 μ

Saccharomyces: 1-5 μ

Denococcus: 0.5-1 μ



Filtration options

- Pads
- Lenticular
- DE Filter
- X-Flow
- Cartridge
- Centrifuge

POWER

WINE LOSS

CAPITAL

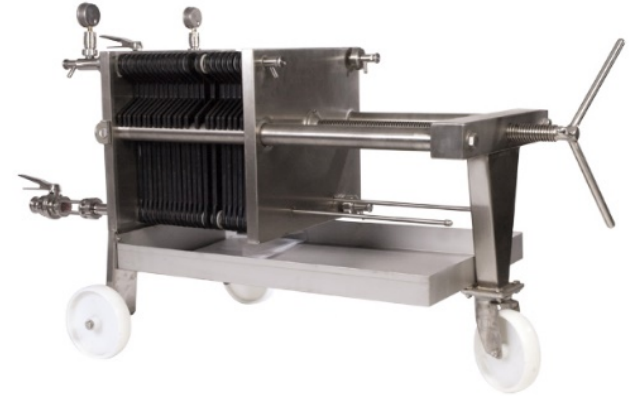
MEDIA COST

LABOR

DISPOSAL

Options for depth filtration of still product

Sheet Filter



Lenticular Filter

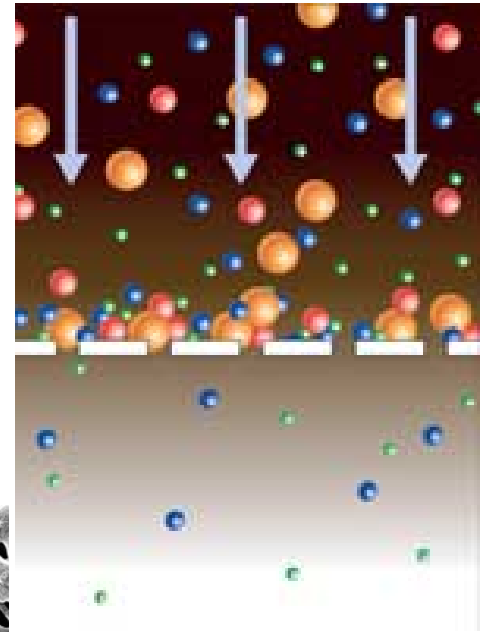
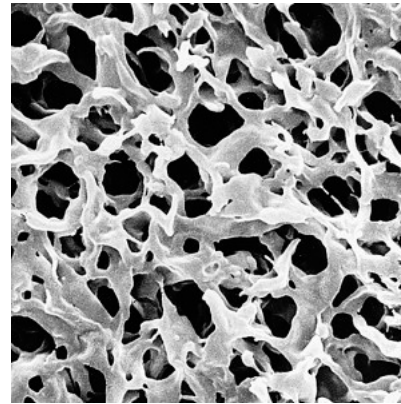
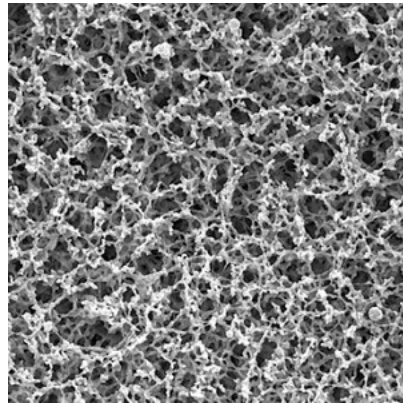
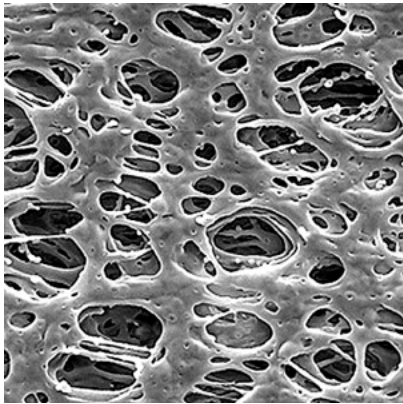


Crossflow

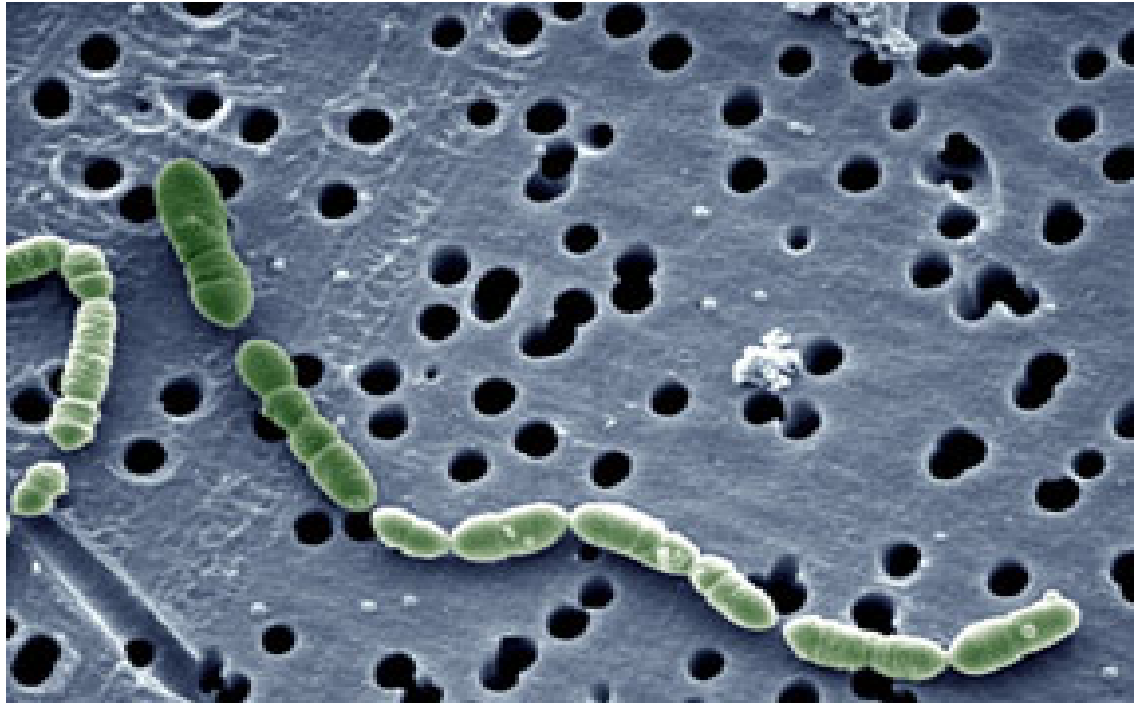


Final Membrane Filters

- High precision / accuracy
- Very low dirt holding capacity
- Examples: X-Flow, PES, PVDF, Glass matrix. Cellulose Acetate



Oenococcus oeni on membrane surface



Why isn't my 0.45 micron filter sheet removing 100% yeast & bacteria?



To sterile filter or not?

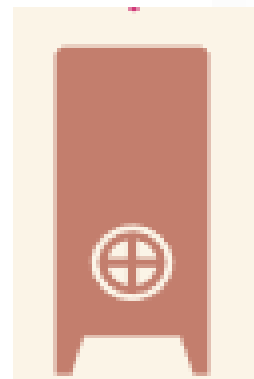
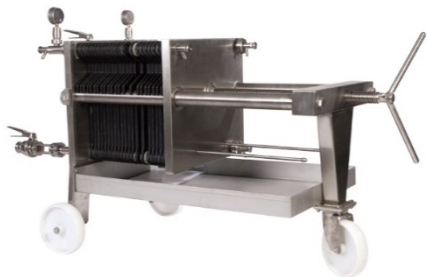
- Through a membrane cartridge (0.45 micron absolute)
- Better to be safe than sorry
- Feeling lucky? First consider all parameters including pH, RS, malic acid, style.
- Cost of a recall
- Bottling line sanitation
- Timing!
- Using encapsulated yeast?

Cartridge (final) Filter



Mostly used for final filtration.
Possible to use as main depth
filter with different porosities of
media for small batches <
100gallons.

Options

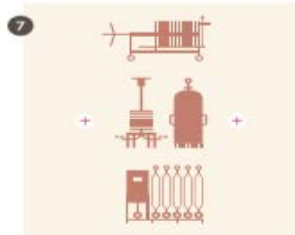


Sparkling winemaking methods

- Charmat: Tank fermented
- Traditional: Bottle fermented
- Pétillante Naturelle: Bottle fermented, not disgorged
- Carbonated: Soda stream 😊, keg or tank

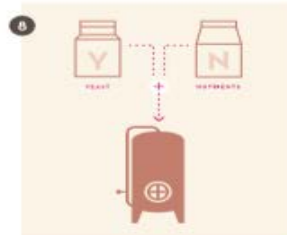
Charmat Method

TANK FERMENTED



CLARIFICATION

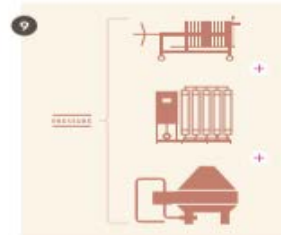
The base wine may be clarified in a number of ways. Depending on the volume of wine and equipment available, filtration is the most common approach to clarification (the use of depth media in a plate and frame filter or a tortuclar filter housing). Crossflow filtration is also an option for clarifying the base wine.



SECONDARY FERMENTATION

The secondary fermentation is carried out in a closed pressure rated tank. It can take weeks for the secondary fermentation to finish. It is up to the discretion of the winemaker to decide the length of time the wine will stay on the yeast lees.

Disclaimer: Ensure all vessels are gas and liquid pressure rated for safe use.



ISOBARIC FILTRATION

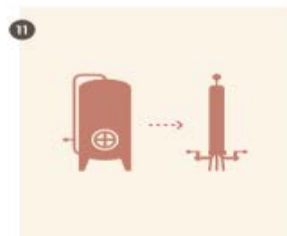
Filtration of the now sparkling wine, in preparation for dosage and bottling, must be done under isobaric conditions to the pressurized bottling tank. Tanks and equipment including pumps and hoses need to be pressure rated for safe use. The wine should also be final filtered in preparation for bottling.

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DOSAGE

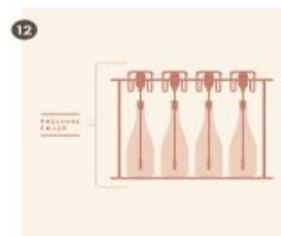
The dosage (dosage liqueur) is the winemaker's final opportunity to add a unique touch to the wine. The dosage may include a mixture of sugars, wines, distilled spirits, etc. It is the special recipe that helps define many wines. It also helps determine the sugar level in the finished wine, which relates to the dosage classification. The dosage solution should be final filtered before addition to the pressurized bottling tank.



FINAL FILTRATION

Prior to filling, the wine goes through a membrane filtration to achieve microbial stability.

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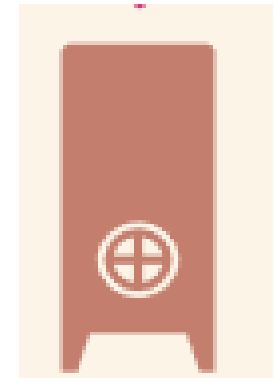


FILLING

The filtered dosage is first added to the pressurized bottling tank, followed by the filtered sparkling wine. The wine is then ready to be bottled with a back pressure filter.

Disclaimer: Ensure all vessels are gas and liquid pressure rated for safe use.

Options for filtering under pressure



Charmat Equipment

- At least two pressure tanks rated for high enough pressure – beer carbonation rating is too low.
- Isobaric. Rated for liquid and gas pressure, including lenticular and cartridge housing and counter pressure bottling line.
- High pressure-rated hoses and pressure gauges

Equipment

- Always have 2 pressure gauges for inlet and outlet to measure differential pressure/pressure drop.

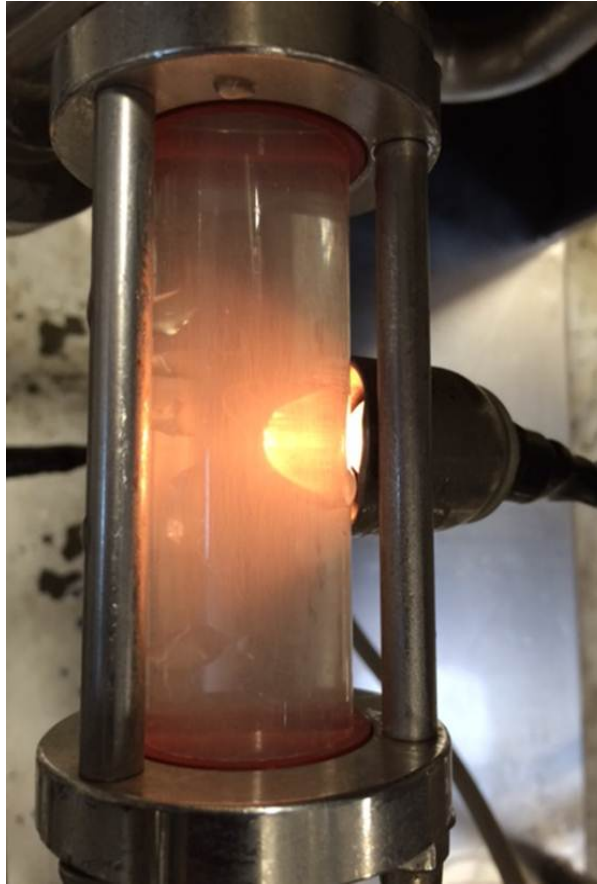
$\Delta p = \text{Inlet pressure} - \text{Outlet pressure}$

- When deciding where to buy, make sure you can get spare parts, service, training and technical support. Make sure you know what media configuration you need.
- Better to have more surface area than you need so you can run at a lower pressure and have a longer media lifespan.

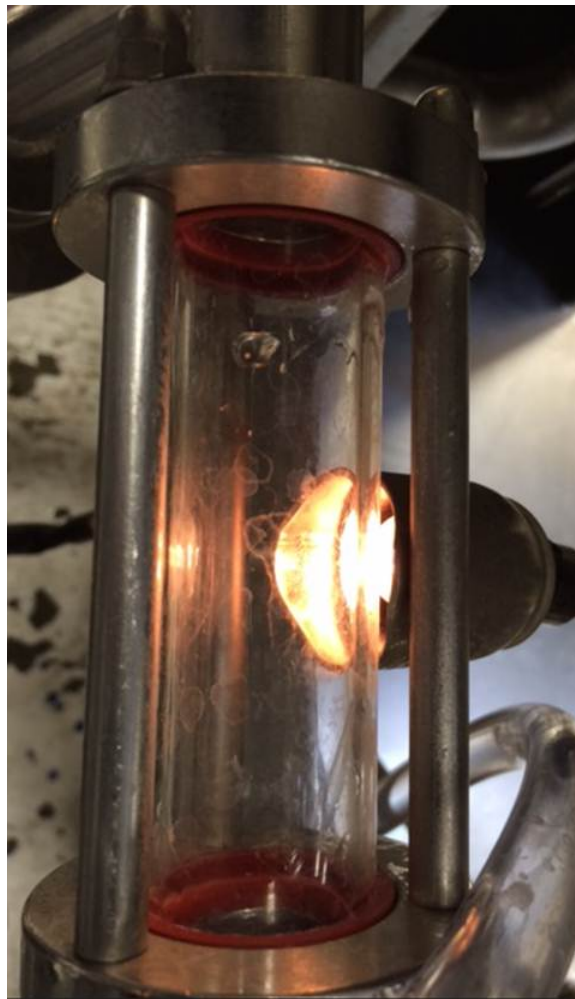
Sanitation

- Sterile filtration is worthless if your equipment isn't clean
- Sterile filters have a log reduction on micro organisms – $10^7/\text{cm}^2$ or 99.98%.
- Pump head inspection – sanitary execution?
- Biofilm build-up in tanks, valves, hoses?
- Bottling line sanitation?
- You can't sanitize a dirty surface.
- First clean, then sanitize – repeat!

BEFORE...



...AFTER



Record Keeping

- Maintain Notes

- Date, Wine, Vintage
- Where the wine is in process
(i.e. after two rackings or stuck MLF)
- Record filter type; capacity; grade; operator
- Track original/terminal Differential Pressure (dP)
- Periodically record:
 - Gallons filtered
 - dP for each filter stage



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ENJOYING

This is the easiest and most favorable step of the entire process. Pop the cork, pour into glasses to share, and enjoy!

Thank you!

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