

Alcohol management in the winery

David Wollan, VA
Filtration/Memstar Pty Ltd
(On behalf Steve Clarkson)

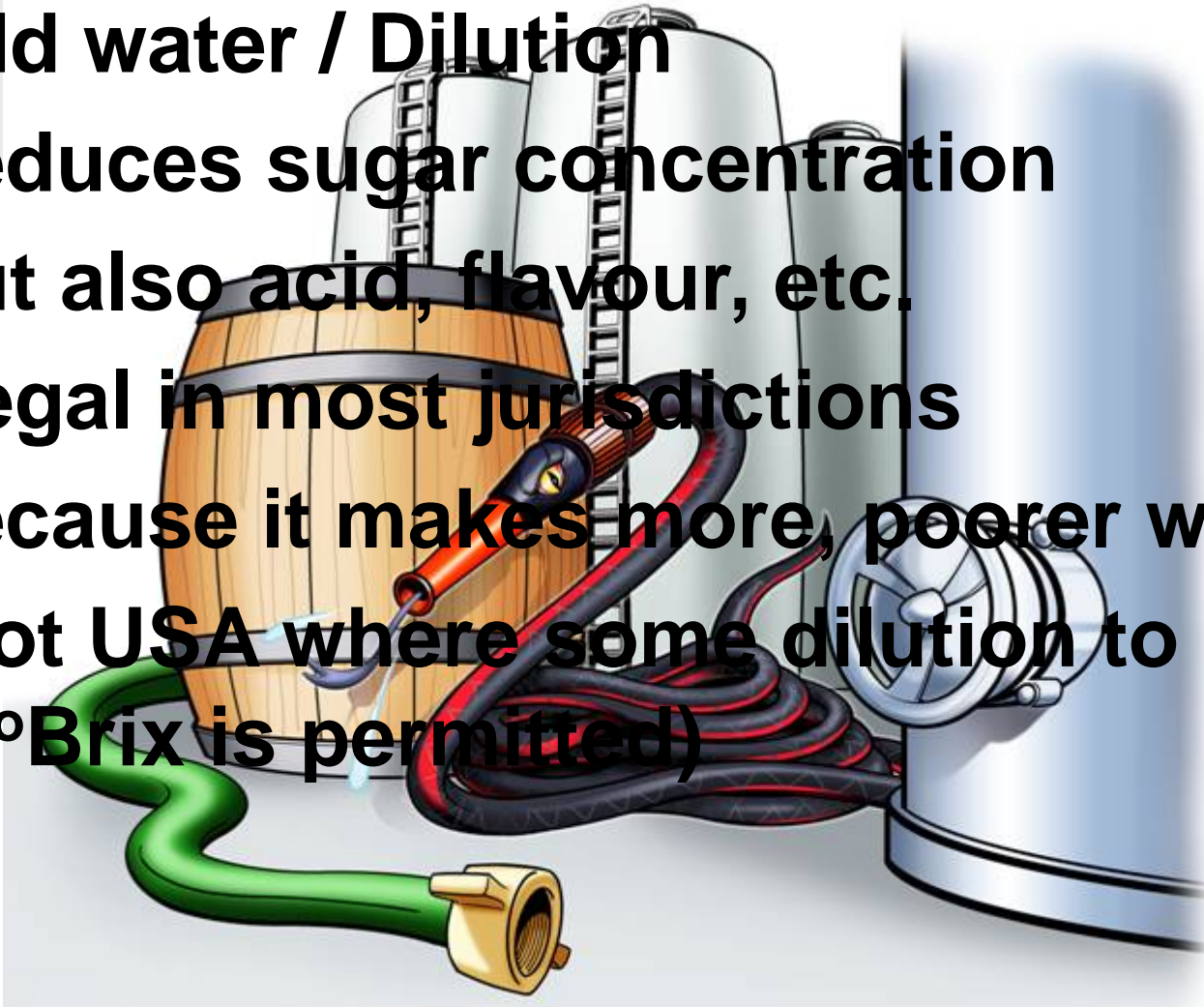
Options for lower wine alcohol



- **Pick grapes earlier (Get it right in the vineyard)**
- **Wait for new yeast strains**
- **Manipulate the composition of must or wine**

Reduce must sugar concentration

- **Add water / Dilution**
- **Reduces sugar concentration**
- **But also acid, flavour, etc.**
- **Illegal in most jurisdictions**
- **Because it makes more, poorer wine?**
- **(Not USA where some dilution to 22°Brix is permitted)**



Options to reduce wine alcohol

- **Add water / dilution**

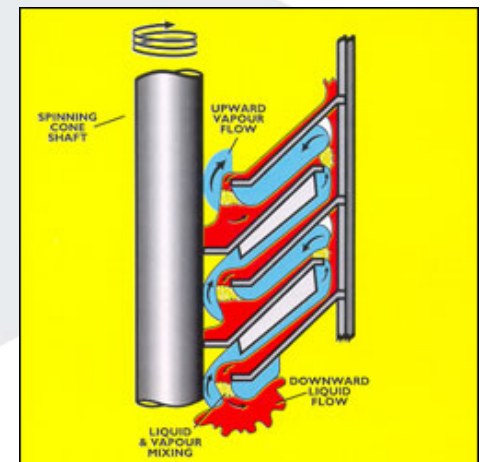
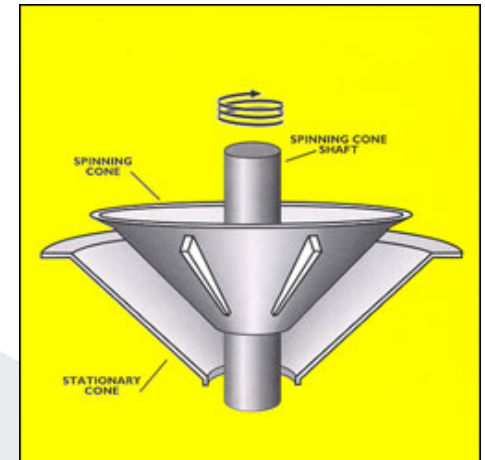
Remove alcohol:-

- **Distillation based techniques**
- **Membrane based techniques**
- **Or a combination of both**

Spinning cone distillation



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SP-AR vacuum distillation

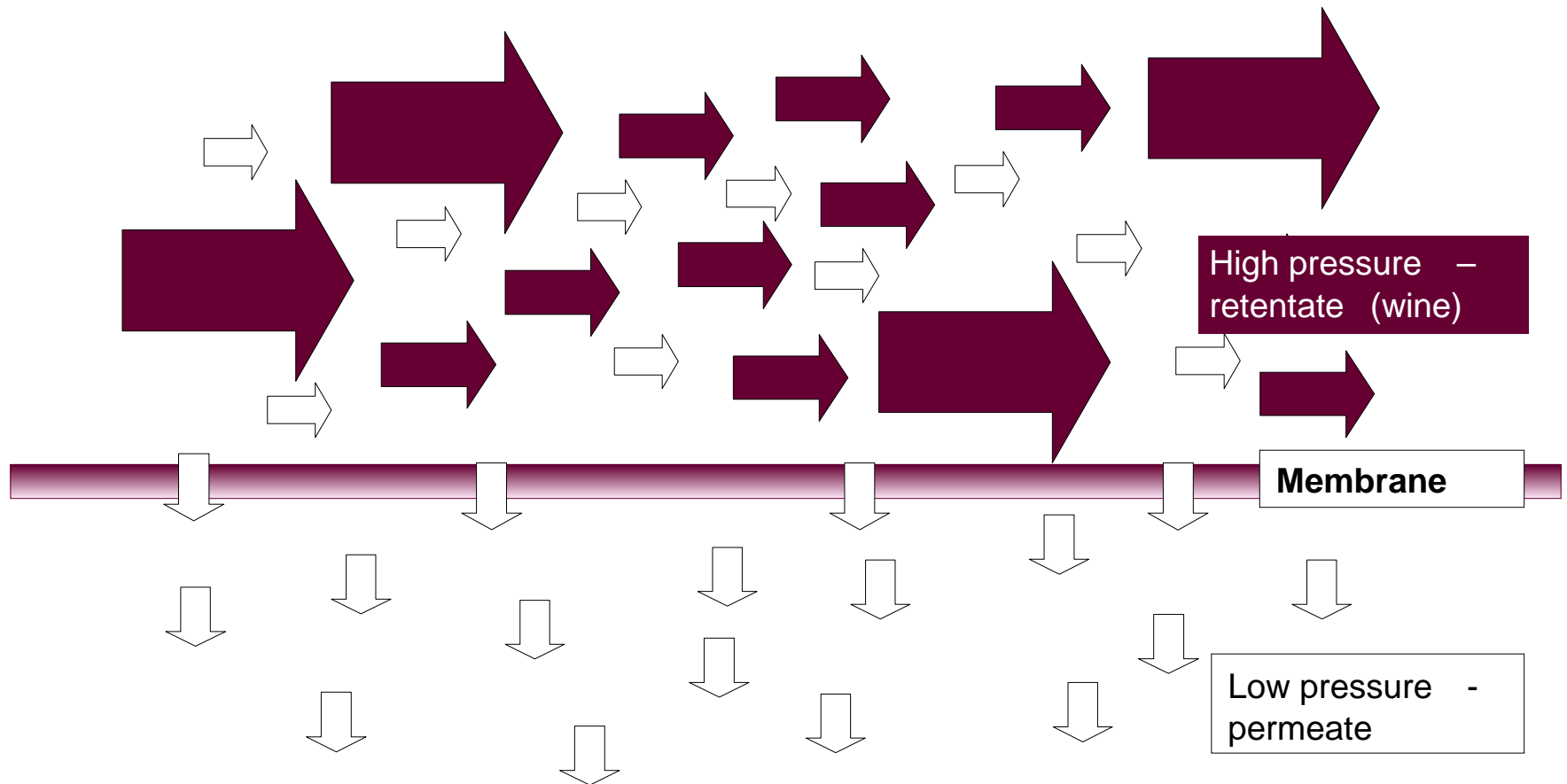


Membrane options-



- **Reverse osmosis**
- **Nanofiltration**
- **Evaporative perstraction (Osmotic distillation)**
- **(Pervaporation – theoretical application only at this stage)**

Membrane separation - Reverse osmosis and nanofiltration



Some wine components' molecular weights

Water	18	
Carbon dioxide	44	
Acetaldehyde	44	
Ethanol	46	
Acetic acid	60	
Ethyl acetate	88	
Lactic acid	90	“tight” RO↑
Malic acid	134	
Tartaric acid	150	
Volatile phenols	120-150	“loose” RO (nanofiltration)↑
Glucose / Fructose	180	
Flavonoids	>300	

Reverse osmosis does not reduce alcohol!



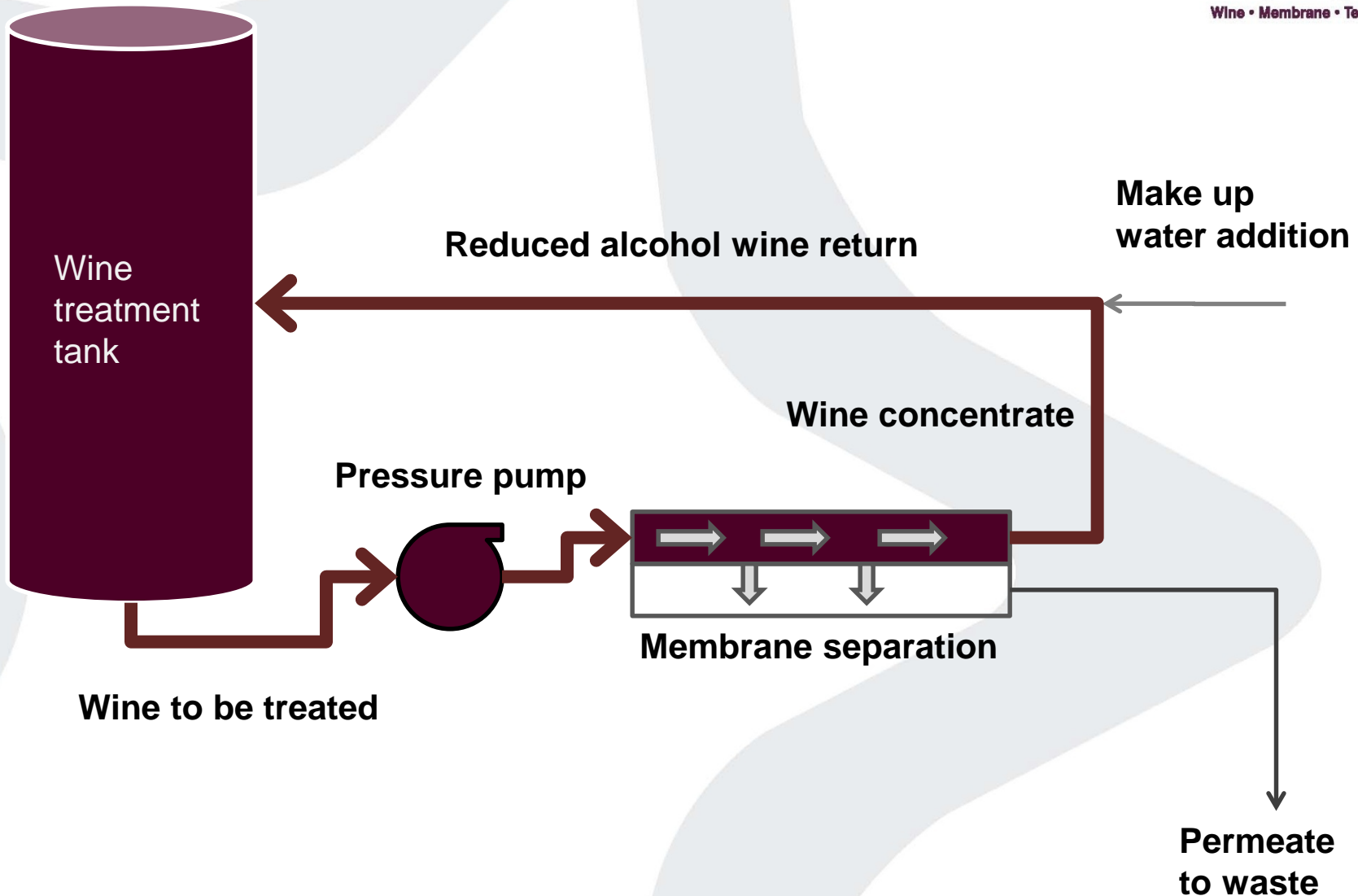
- **A common misunderstanding**
- **By itself, RO increases the concentration of alcohol in treated wine**
- **Some secondary treatment is essential**
- **(This also applies to nanofiltration)**

Comparison of concentration effects – Different membrane types



	Titrateable Acidity (g/l as tartaric acid)	Alcohol (% v/v)
Control wine	5.9	14.10%

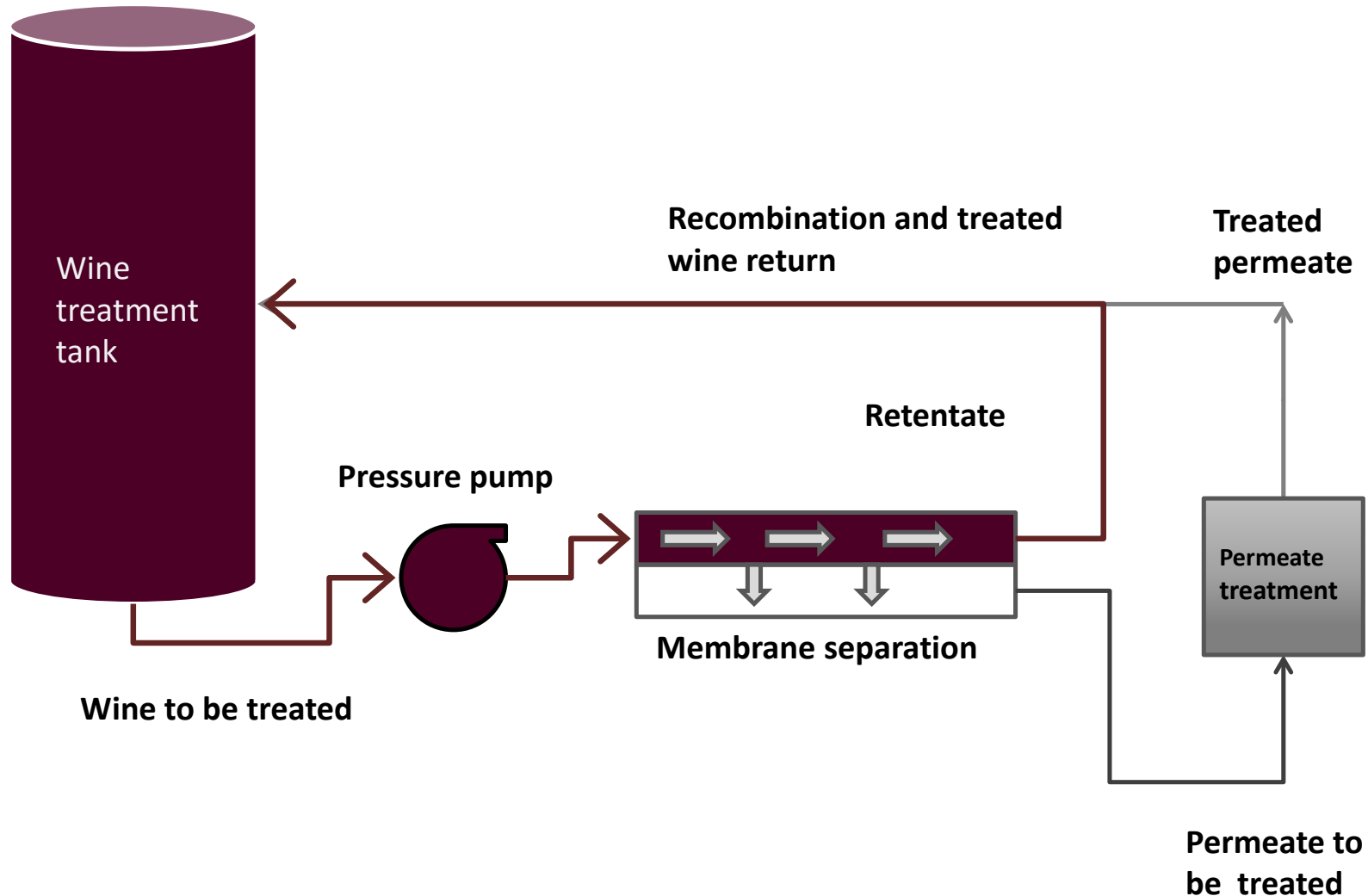
Reverse osmosis and water addition



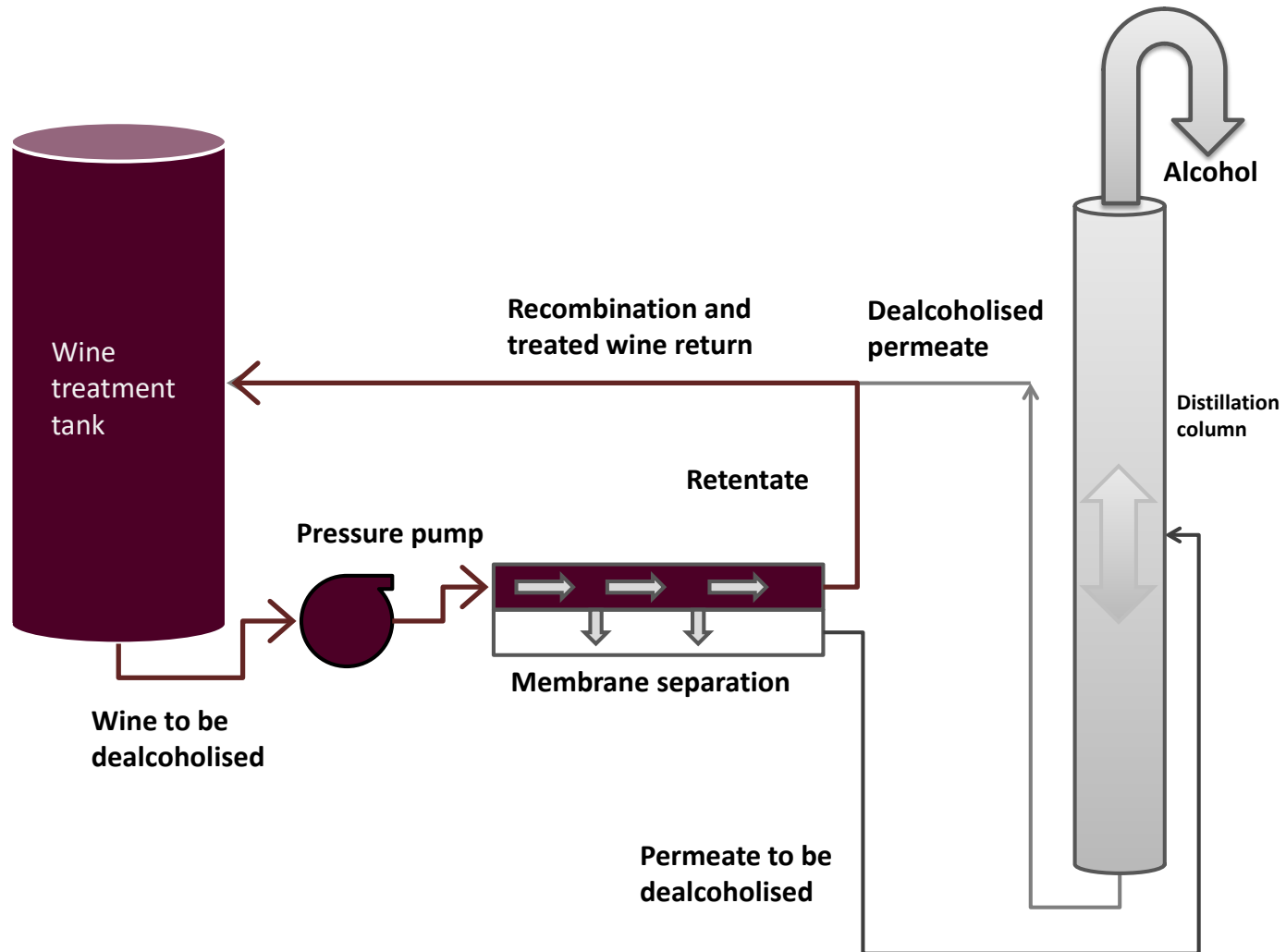
Problem of water addition

Water	18	
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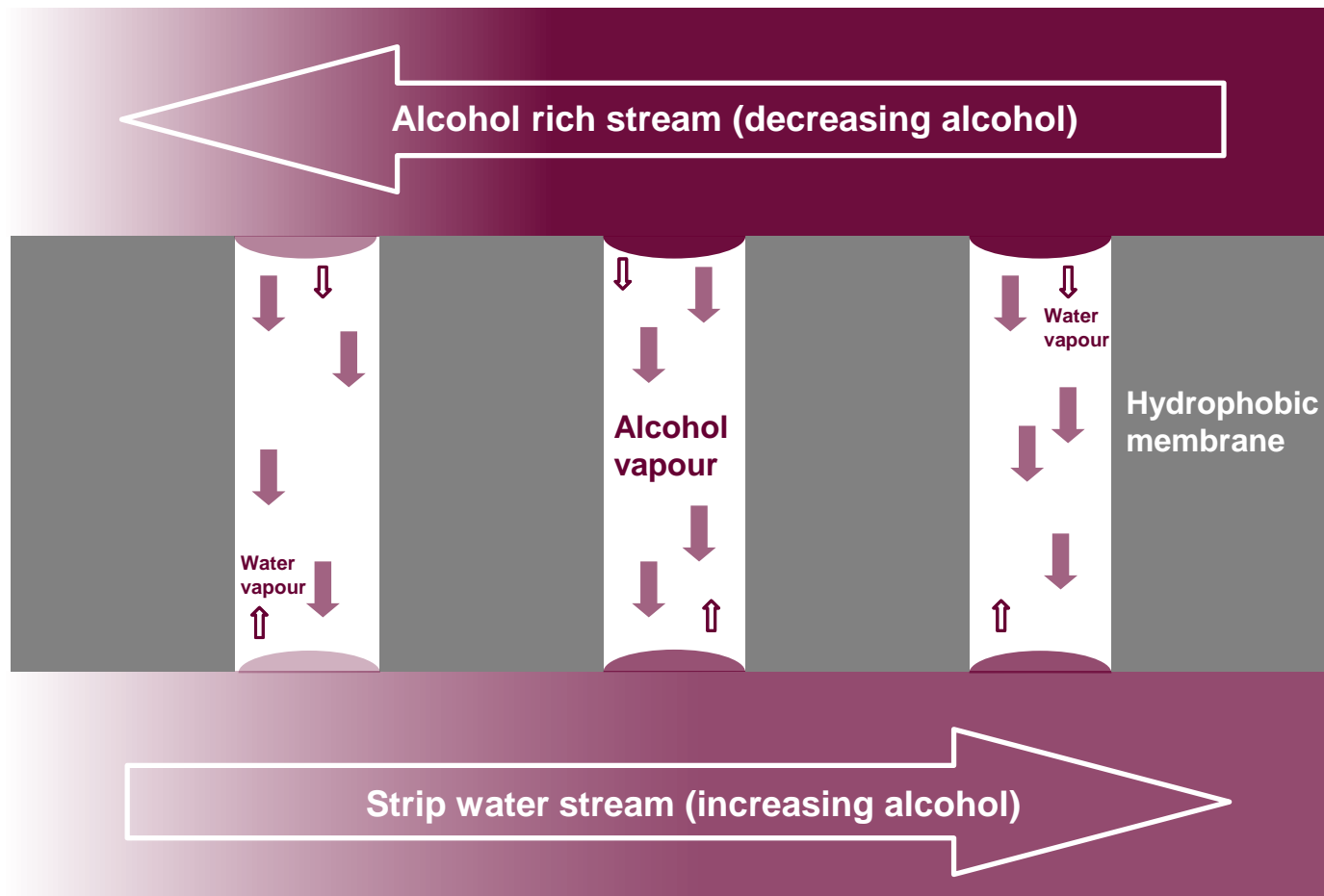
Membrane separation, treatment and recombination



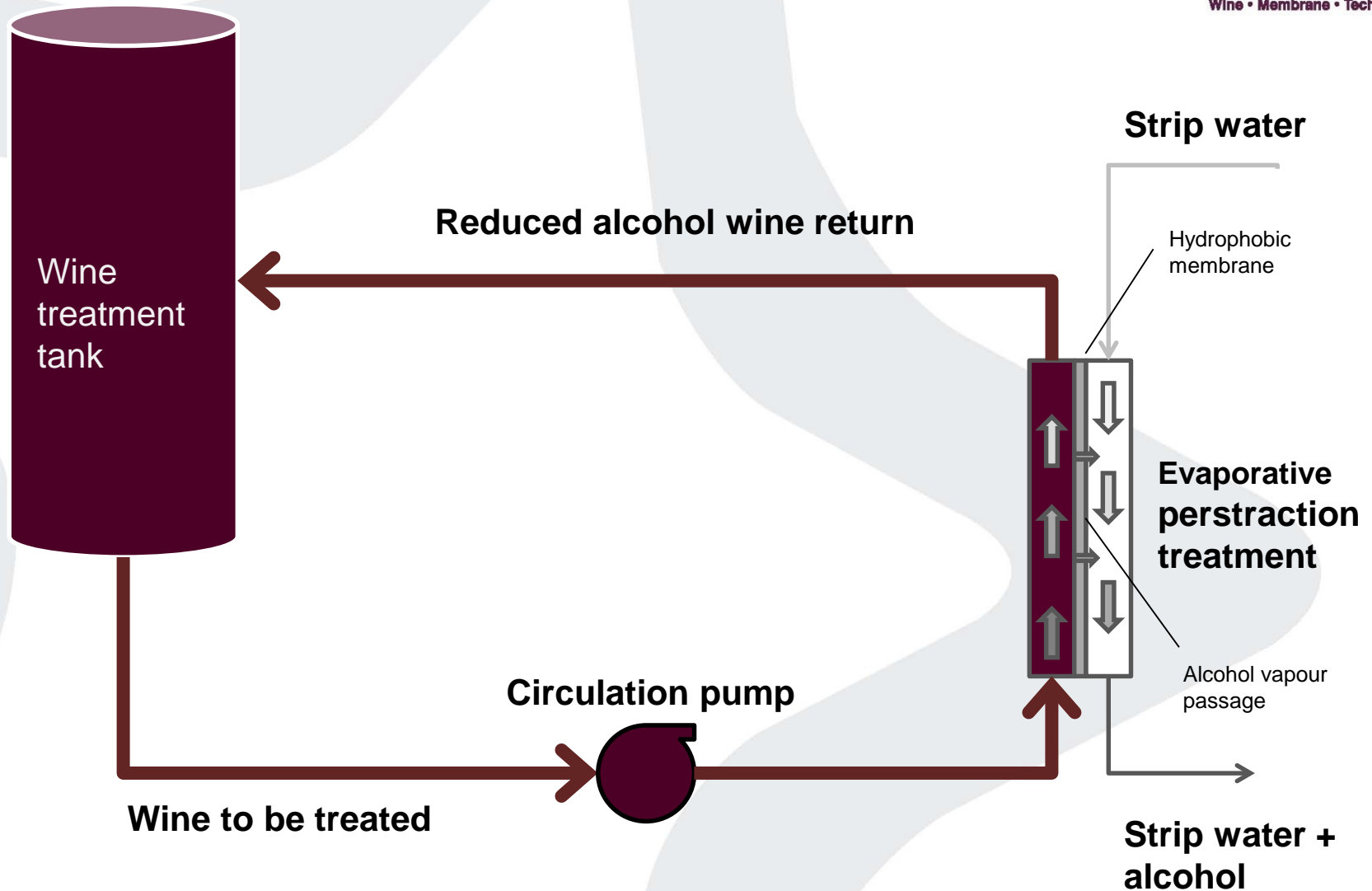
Membrane separation and permeate distillation



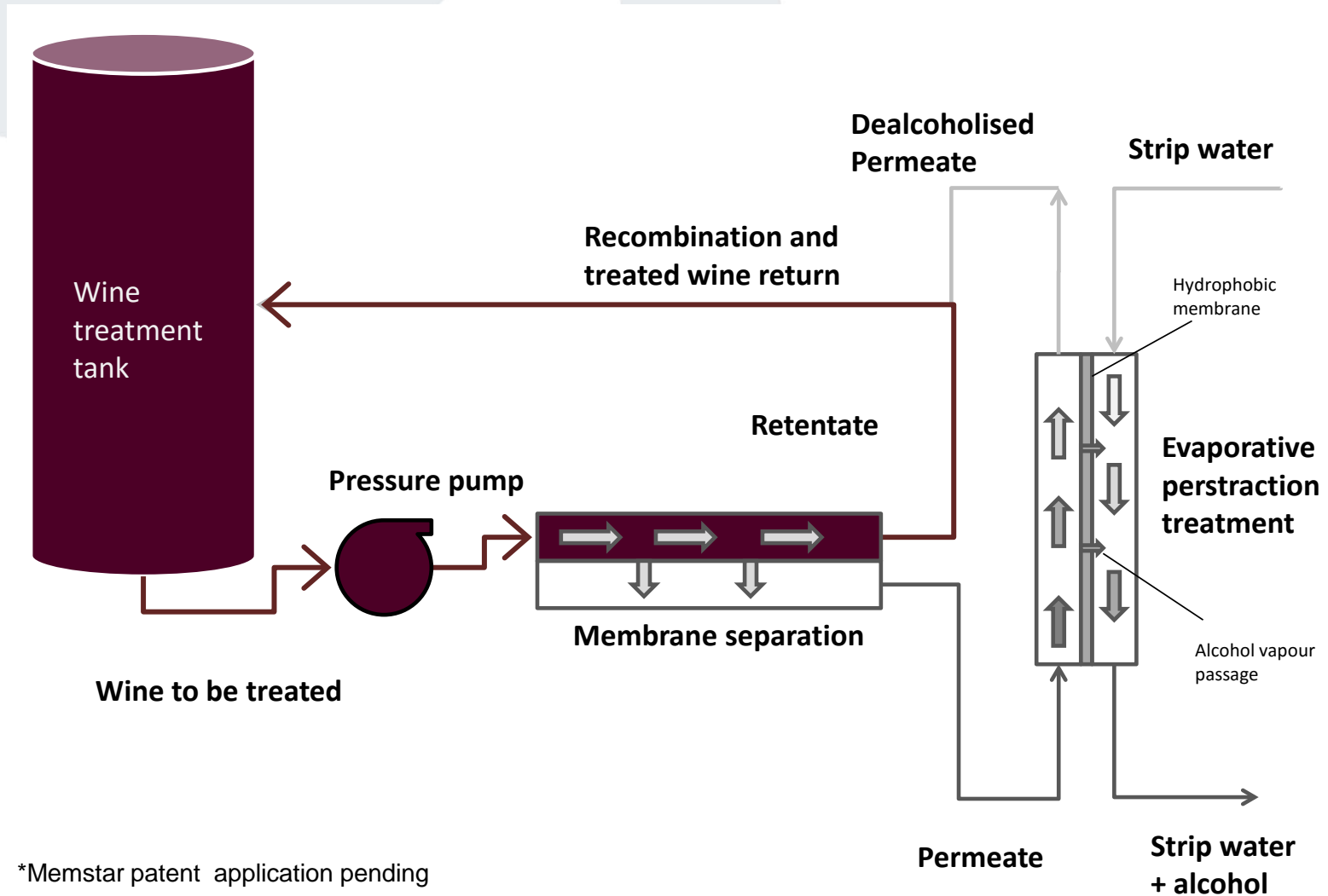
Evaporative perstraction



Direct evaporative perstraction (Osmotic distillation)



Membrane separation and evaporative perstraction*



*Memstar patent application pending

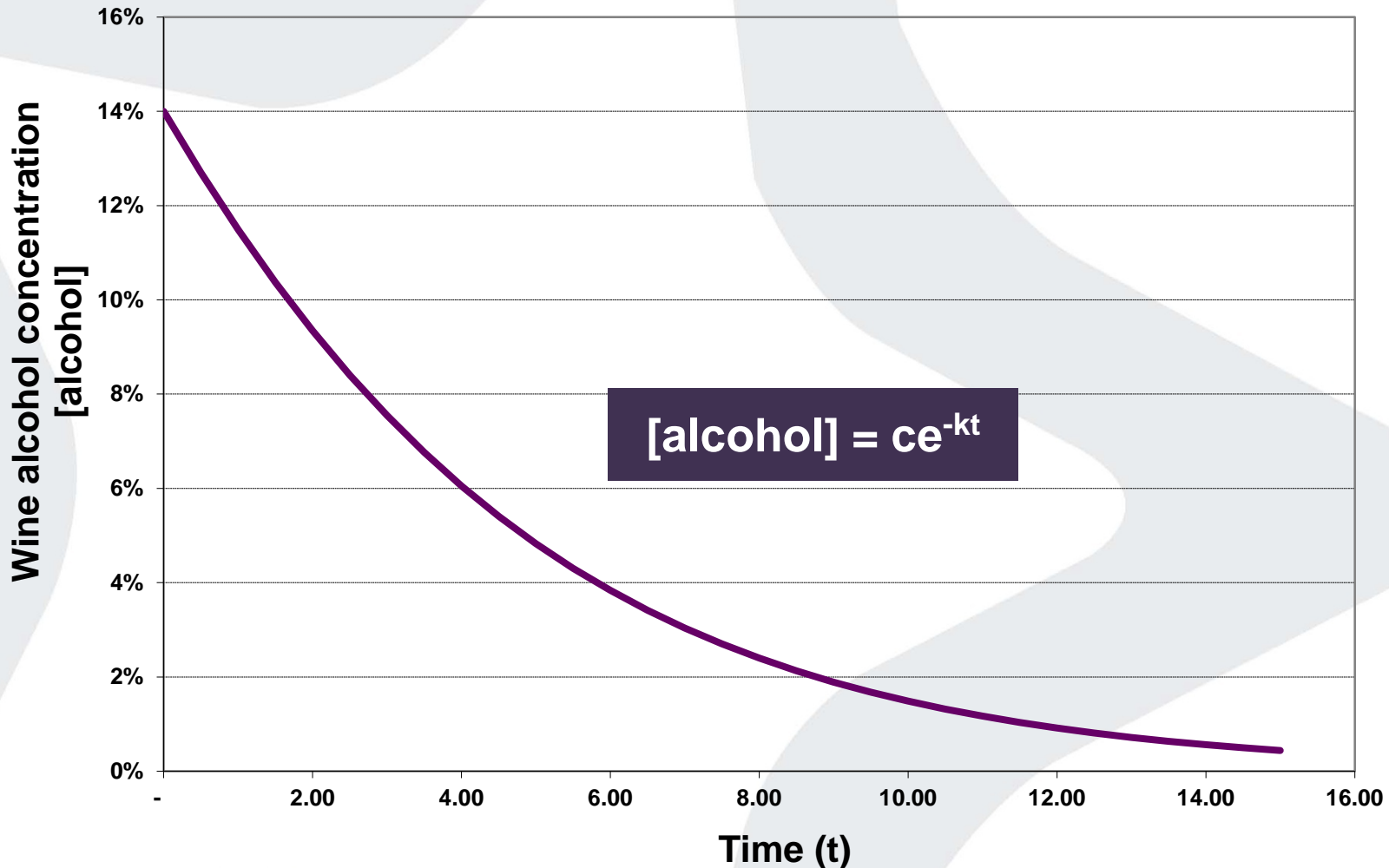
Alcohol adjustment plant



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Alcohol reduction over time



Practical implications:



- **With membrane based processes,**
- **Impossible to achieve zero alcohol concentration**
- ***“It is more efficient to take a little alcohol from a lot of wine than a lot of alcohol from a little wine.”***
- **Distillation systems are more suitable for very low alcohol wines**

“You take alcohol
out of wine?
...Why would you
want to do
that?!!”