AWITC 2013 – W24

Heat and cold stability

Continuous Stabilization Methods

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Content

- Why adopt continuous process methods?
- What are the options?
- Two common systems
- What system is best for me?

Continuous Processes

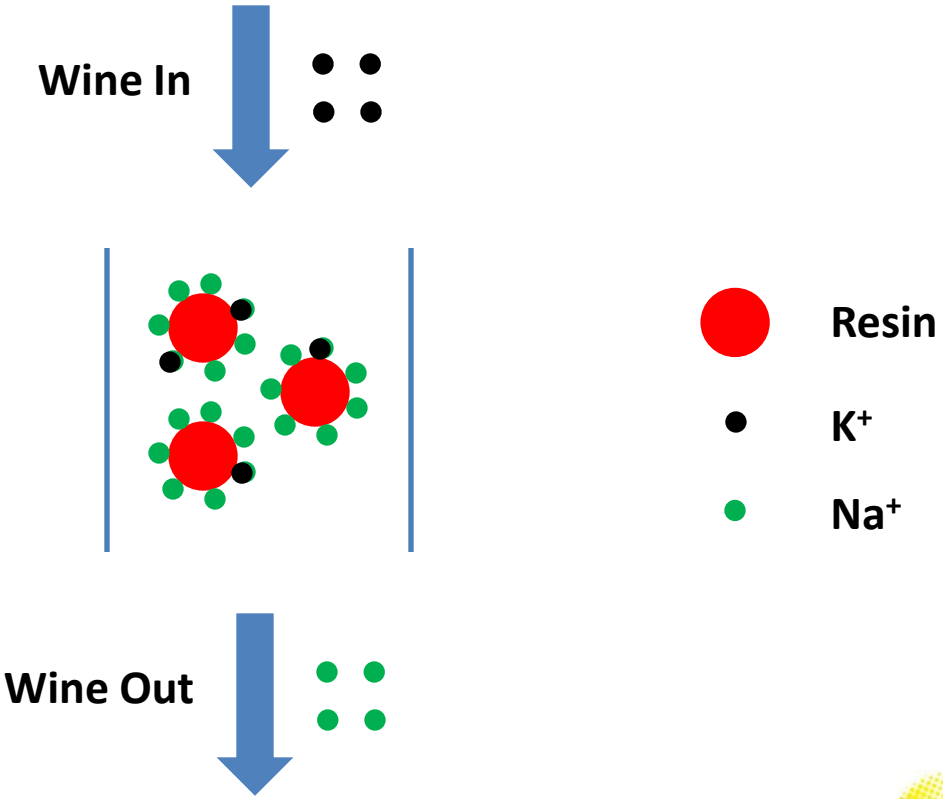
- Energy efficient
- Fast / just in time
- Lower losses
- Enables easier optimisation
- Cost effective
- Environmentally friendly (potentially)

Continuous Stab Methods

- Ion Exchange
- Rapid Contact
- Electro-dialysis

Ion exchange

- Cation exchange.



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Ion exchange (cont.)

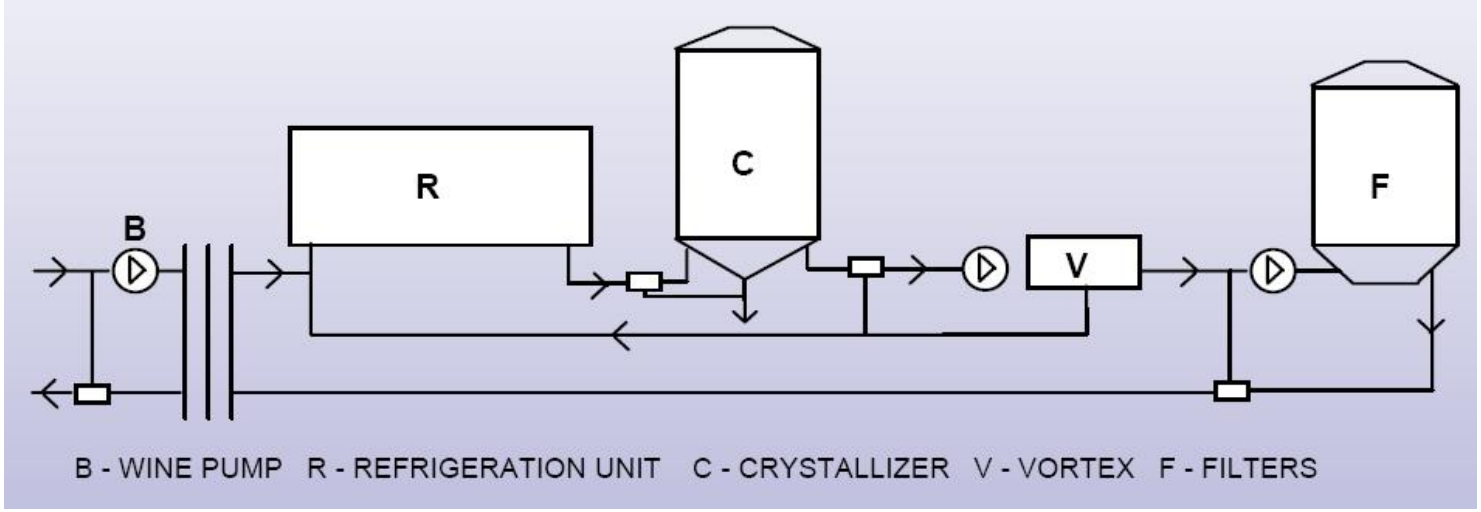
- At one point in time was widely used in Australia and USA.
  - Since 1950s in Australia.
- Cost:
  - Typically less than 10% of refrigeration (Rankine 2004).
- Sensory:
  - Dessert wine not detectably altered but delicate table wines can be affected (Rankine 2004).
- Increase in sodium can be undesirable.
- Highly saline wastewater from regeneration can be problematic.
- Complex regulatory issues:
  - Have fluctuated with regards to EC, apparently now allowed according to EC-Australia trade agreement (2009) and OIV Codex (2009) but there are additional qualifications about use in the OIV Code of practices (2010).
    - Would need to be entirely sure of country specific regulations before use.

Rapid contact stabilisation (continuous)

- Packaged continuous cold stabilisation systems have been offered by several companies.
  - Often try to avoid the addition of fresh seed crystals.
    - Employ some form of crystal retention.
  - DE filter or disc-stack centrifuge for final crystal removal.
  - Heat exchanger for energy recovery.

Rapid contact stabilisation (continuous)

- Vinipal system (1,000 – 30,000 L/hr).



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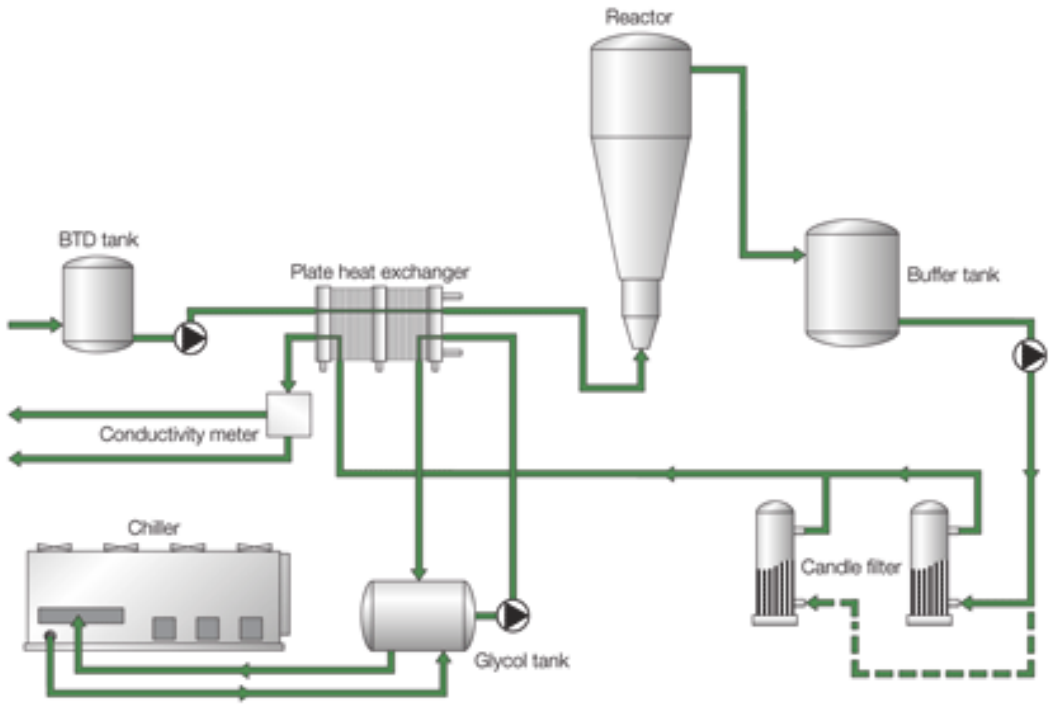
Rapid contact stabilisation (continuous)

- Alfa-Laval Frigoflash (2,500 – 20,000 L/hr).



Flow diagram (example) for Frigoflash system

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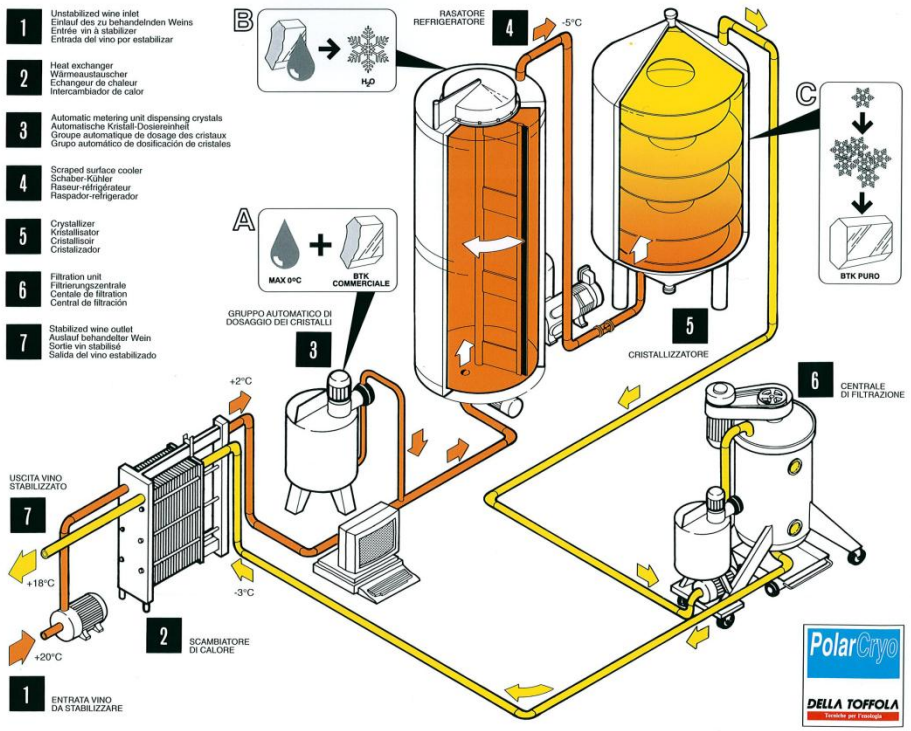
Rapid contact stabilisation (continuous)

- Della Toffola Polar (1,000 – 20,000 L/hr).



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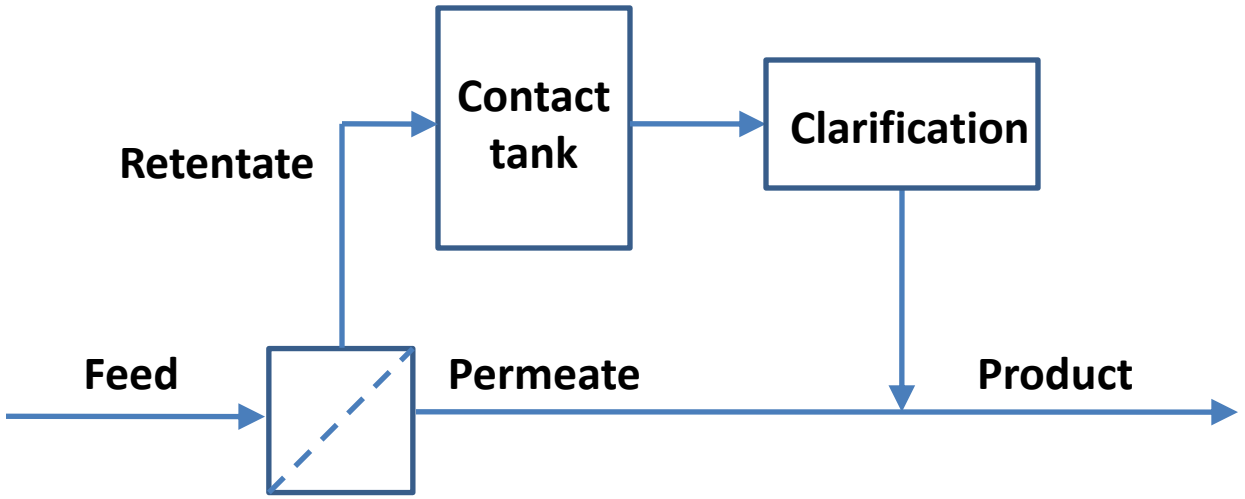
Membrane processes

- Nanofiltration.



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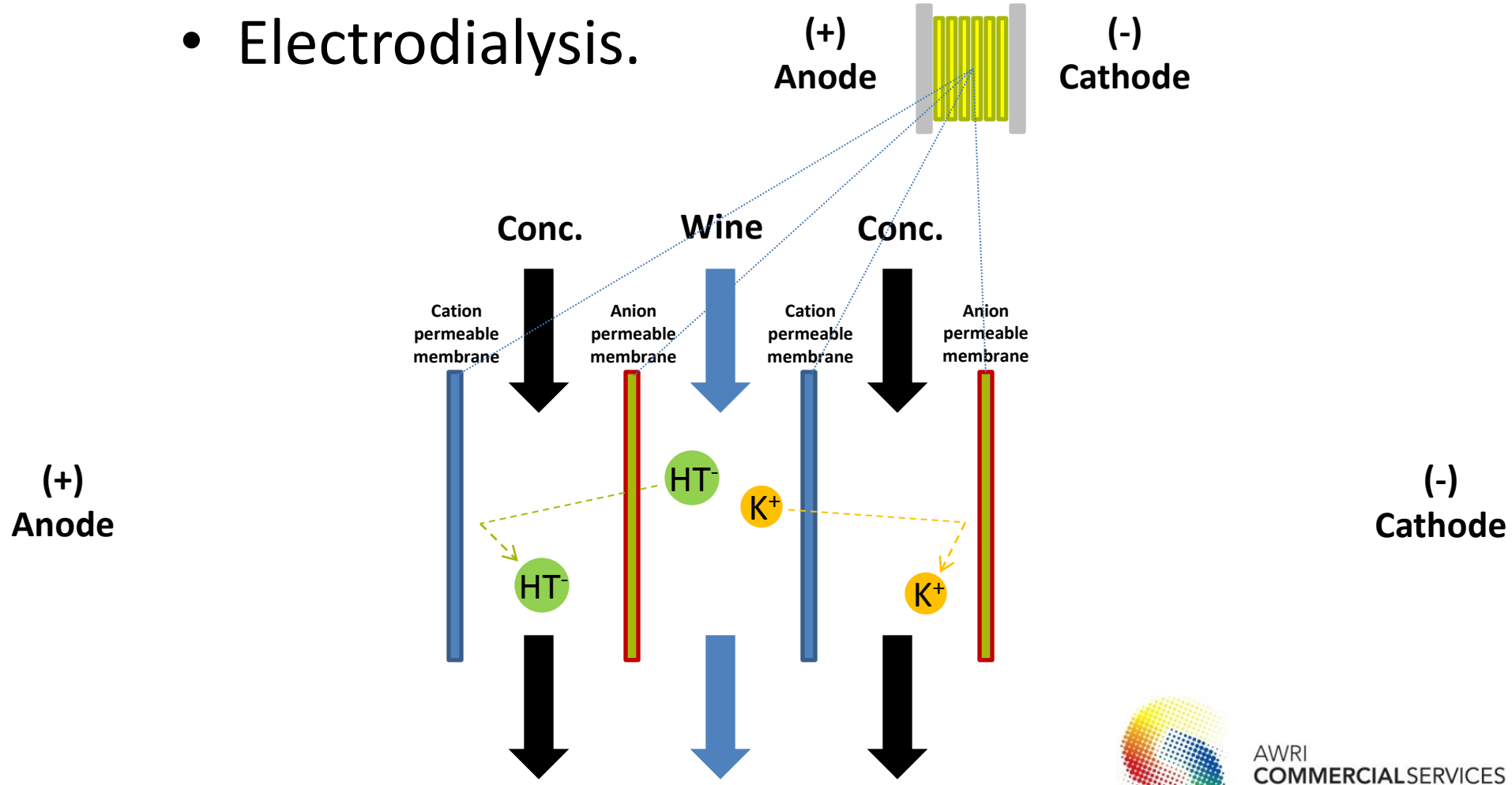
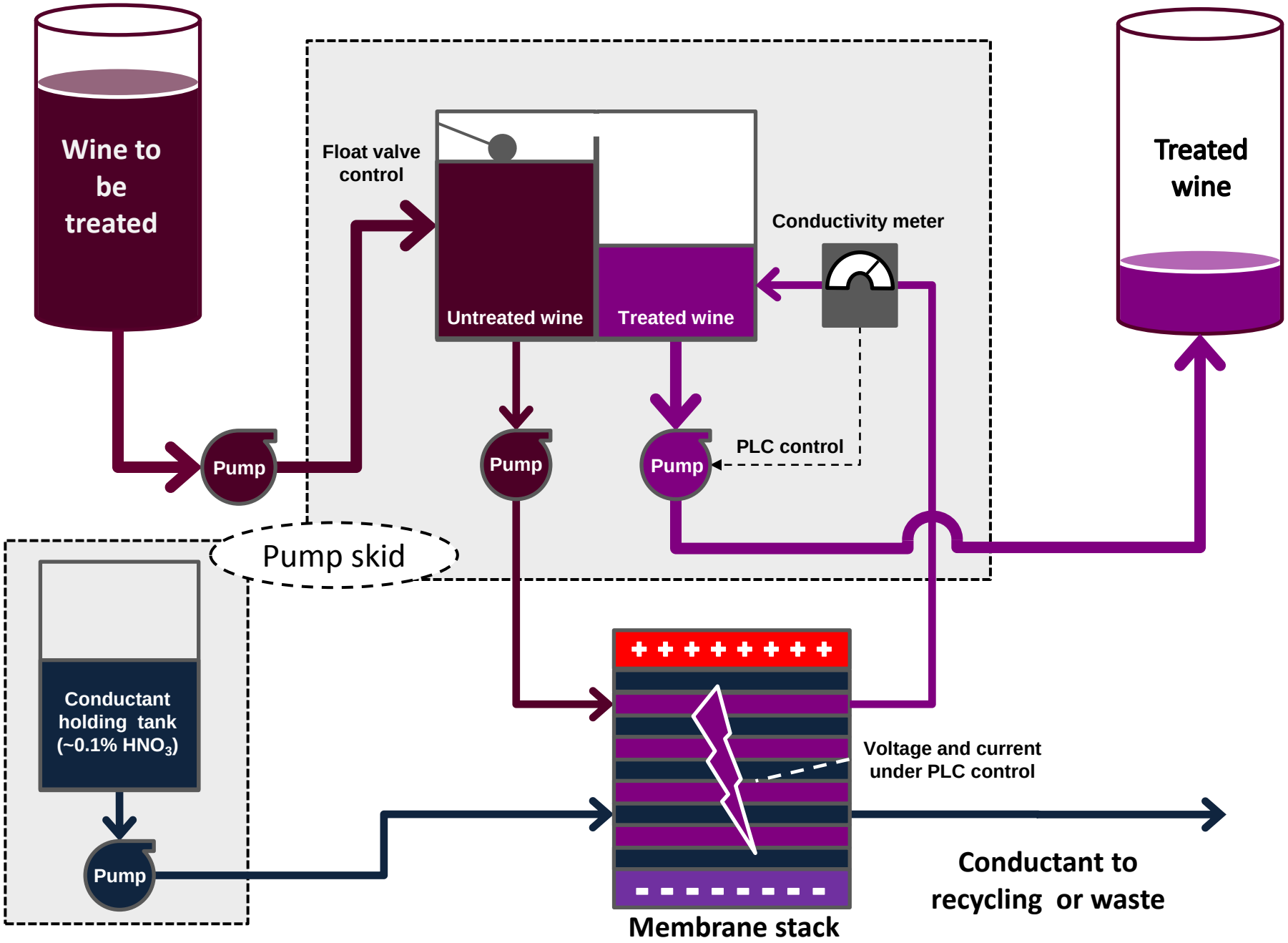
Membrane processes (cont.)

- Electrodialysis.




Wine to be treated
Float valve control
Untreated wine
Treated wine
Conductivity meter
Treated wine
Pump
Pump
Pump
PLC control
Pump skid
Conductant holding tank (~0.1% HNO_3)
Pump
Voltage and current under PLC control
Conductant to recycling or waste
Membrane stack


SAFETY
SHOWER
EUROCIA

The results – previous trials

	Traditional Cold	Electro dialysis	Rapid Contact
Electricity Consumption (Kwh/kL)	Various (15-80)	1.5-3	7
Water Consumption (L/kL)	75-150	250	100
Waste Water Volume (L/KL)	75	250	100
Time Taken (hrs/KL)	0.5	>300	0.3

The trial – Energy Consumption

- Continuous methods are more energy efficient
  - Heat recovery
  - ED does not use temperature

- Price comparison (1.8c/L v 0.03 c/L does it really matter. Bottle = 45c, Cork = 25c, Screw Cap= 10c)

- What is your starting and finishing temperature? This has a big impact.

So what is the best method?

- Largely determined by winery needs
- Continuous methods have definite advantages
- Capital cost is high
- Labour up-skilling

- Current refrigeration capacity

Continuous Processing Benefits

- Faster processing time means greater control
- Repeat treatments
- Coupling with other JIT processes may have many benefits
- Recovery of Heat/COLD saves energy
- ED works differently – may not strip valuable long chain molecules that are beneficial in other ways