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Cold stability, testing for a moving target.

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Cold Stability, what is it?

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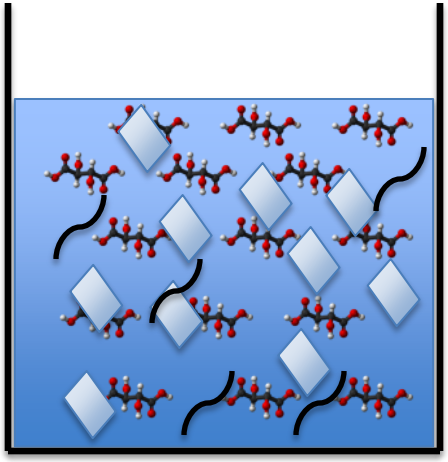
- ***Cold stability*** *is essentially a wines ability to resist the precipitation of tartrates.*
- Components in wine (crystallization inhibitors) help prevent the tartrate from precipitating.
- As the wine matures or undergoes winemaking processes the levels of these crystallization compounds can change, allowing tartrate to precipitate.
- This can happen even after traditional cold stabilization.



Potential vs current

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This means there are essentially two types of tartrate stability!

Current Stability

A measure to show if the wine will precipitate tartrates here and now if chilled.

Potential Instability

A measure of the wine's potential to become unstable as the wine loses crystallization inhibitors (ages/changes), even if it does not precipitate crystals when chilled.

Testing methods

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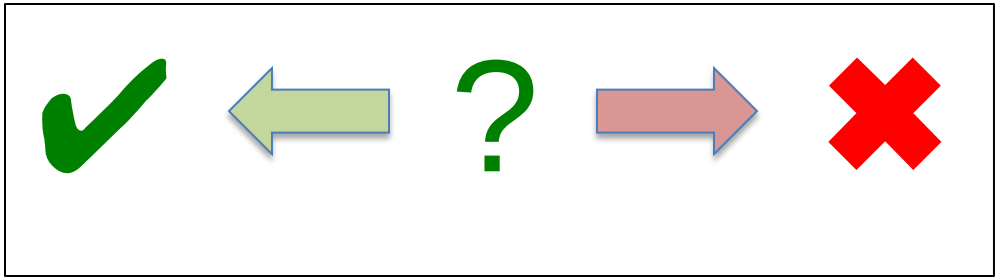
There are nearly as many cold stability testing methods as there are wine varieties;

and just as much debate about which is best.

- We will touch on the four most commonly used;
  - Freeze/thaw
  - Cold incubation / brine
  - Mini contact / conductivity
  - Saturation temp



Freeze / thaw

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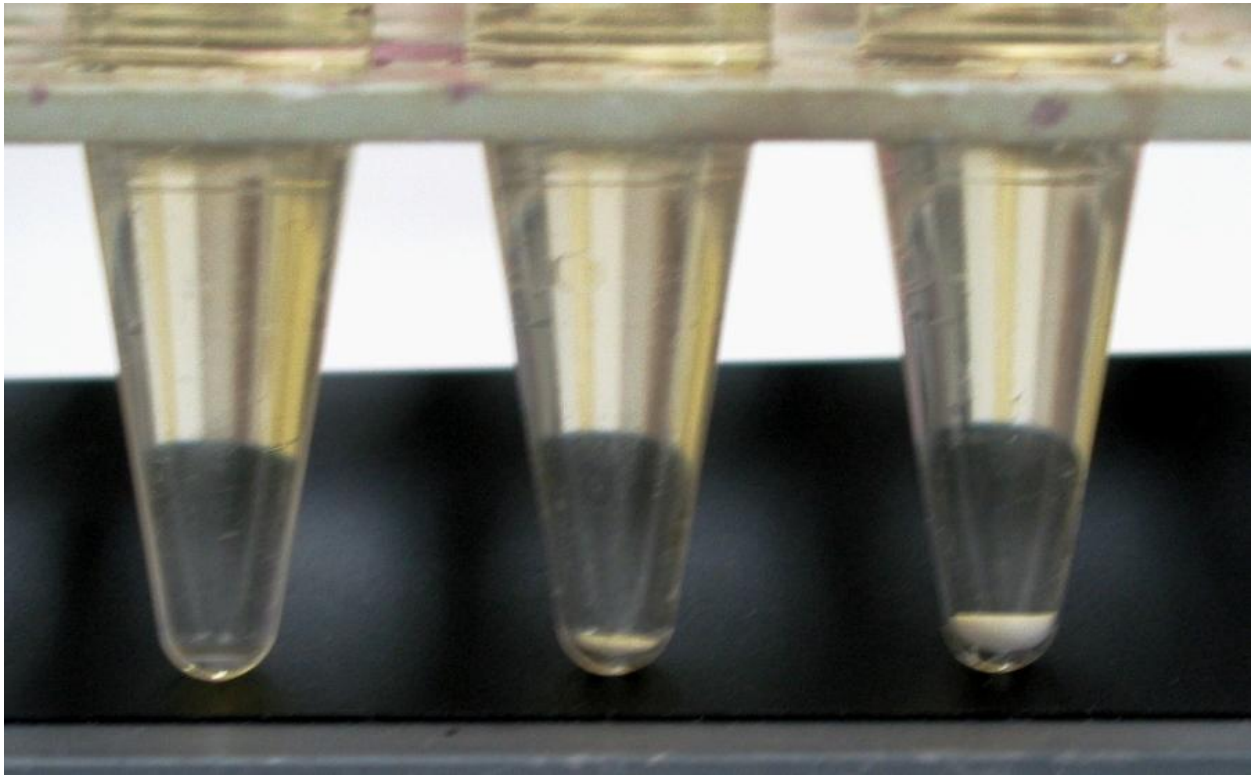
- ✔ Quick cheap and dirty.
- ✖ Can pretty well get whatever result you need depending on the freezing time.

Results impacted by:

- *Sample size*
- *Sample shape*
- *Location in the freezer*
- *Particulates*
- *The phase of the moon (really)*



Brine or 3 day test

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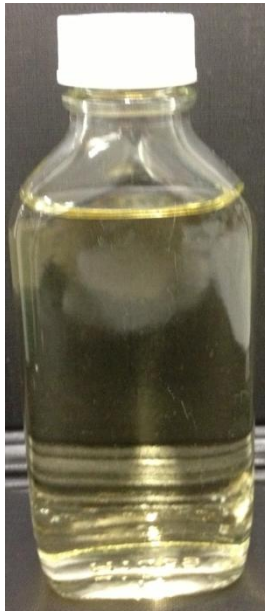
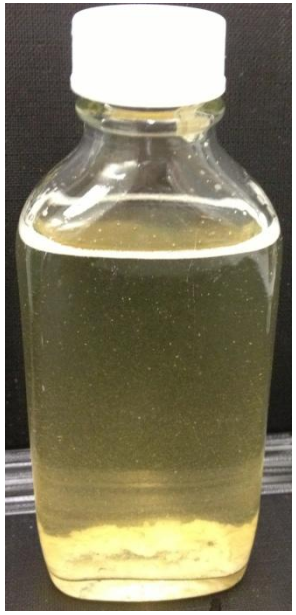
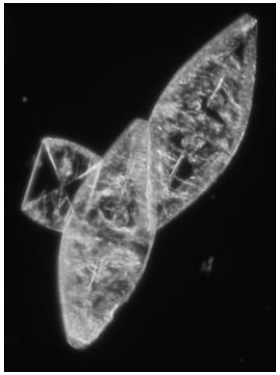


3-7 days -4 °C





✔ Considered the reference method by many Australian wineries.

✔ Gives a good indication of current stability.

✖ But it does not give an indication of the wines future (potential) stability.

✖ Can be hard to interpret for reds.

➢Best procedure is to bring it back to 20°C for a few hours to allow any colour compounds to go back in solution.

➢Check the solids left for crystals.

Mini-contact or conductivity methods

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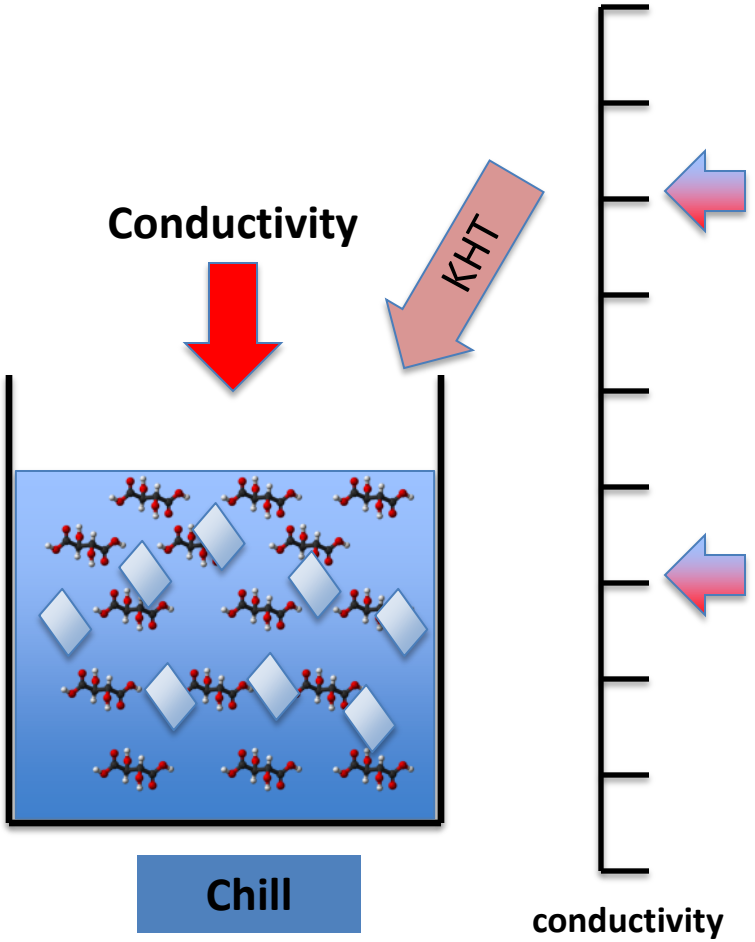
Conductivity is a measure of ions in wine, mainly attributed to K^+.

Essentially all these methods try to measure the change in conductivity after seeding a cold sample of the wine.

- *Principle:* Crystallisation causes a decrease in conductivity over time.
- A big change in conductivity reflects a large tartrate precipitation and hence a high degree of instability.
- More advanced methods determine rate of change of conductivity to give a more accurate determination.
- Constant agitation and monitoring of conductivity.



Mini-contact or conductivity methods

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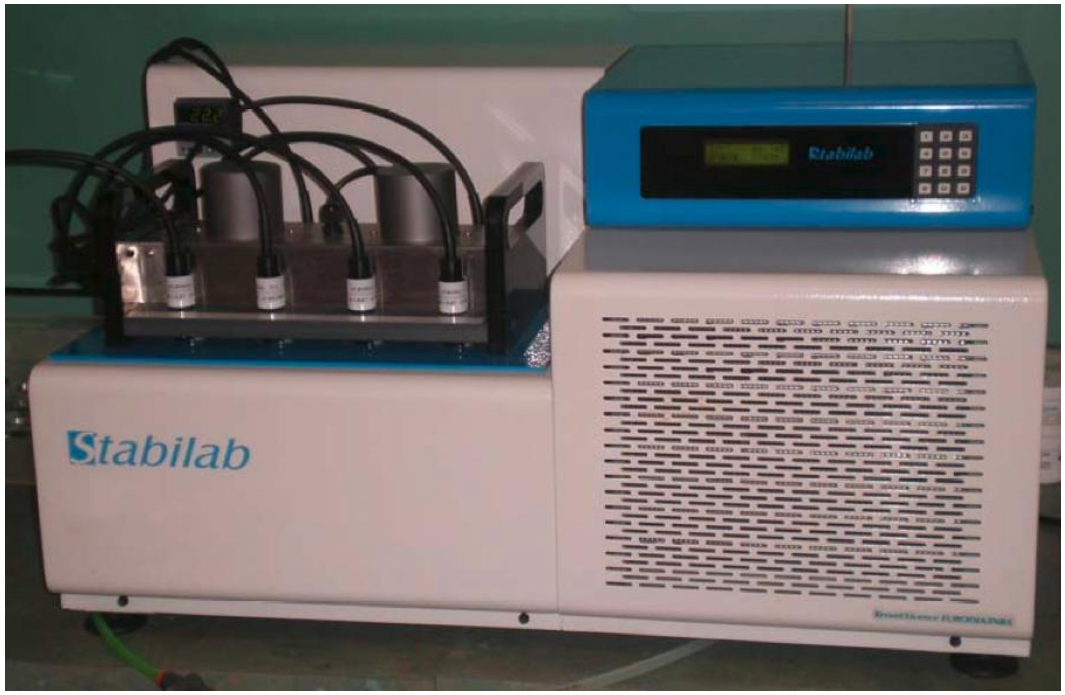
- ✔ Gives a reasonable indication of the wines potential stability.
- ✔ Very quick compared to the 4 day test.
- ✖ However the seeding can swamp the natural crystallization inhibitors giving false positives and resulting in over stabilization.
- ✖ Quite expensive to set up to do well.
- ✖ Can be difficult to interpret for some wines with either very high or very low conductivities.
- ✖ Often difficult to correlate with traditional results for reds.



Saturation temperature (Tsat)

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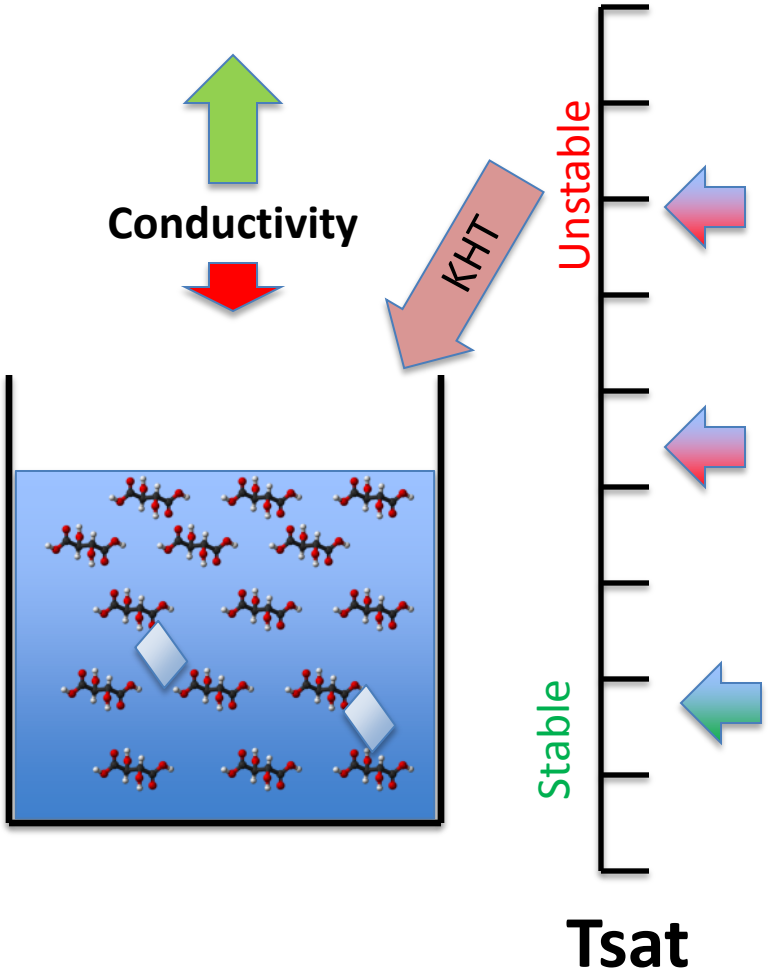
- **Tsat** is defined as minimum temperature required to induce crystal formation; the lower the better.
- The method is based on increase in conductivity at room temperature; determined by calculating the temperature at which the wine will (theoretically) throw a deposit.

$$Tsat = T - \frac{(\mu S_2 - \mu S_1)}{33}$$

✔ Indication of potential stability

✖ Crystallisation inhibitors not accounted for



In summary??????

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	Tests Current Stability?	Tests Potential Stability?	Setup costs $$$$
Freeze /Thaw	✖	✖	$
3 day brine	✔	✖(?)	$$
Conductivity	✖(?)	✔	$$$
Tsat	✖	✔	$

No perfect method (at least yet).

What is the best option???

The best option!

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A combination approach!

A combination of Brine (current stability) and Sat Temp (potential stability).

Brine ✖ Sat Temp ✖

➔ brutally unstable, probably chill and seed.

Brine ✔ Sat Temp ✖

➔ Currently stable but could throw a deposit with time. Think about a crystallization inhibitor.

Brine ✔ Sat Temp ✔

➔ Stable for the duration. No need to do anything else.

Questions?

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