Reducing the Risk of Production Contamination and Flavour Tainting Through Effective Cleaning Chemicals and Processes

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Dominant®
…we bring the chemistry

What's the Point?

- Wine
  - We all love to drink it
  - You are all here to manufacture it

- Topics of interest:
  - Why does cleaning matter?
  - Methods to minimise contamination and flavour taint via appropriate and effective cleaning
  - Sanitation is important!
  - Environmental conscience

Benefits of Cleaning

- Mitigate **cross-contamination** between different grape varieties or production methods
- Remove residual **microorganisms** (yeast/bacteria)
- Control build-up of crystallised and amorphous **deposits** in tanks and transfer lines/pipes
- Maintain maximum **flow** through transfer lines/pipes for operational efficiency
- **Overall** – minimise re-work of finished goods!

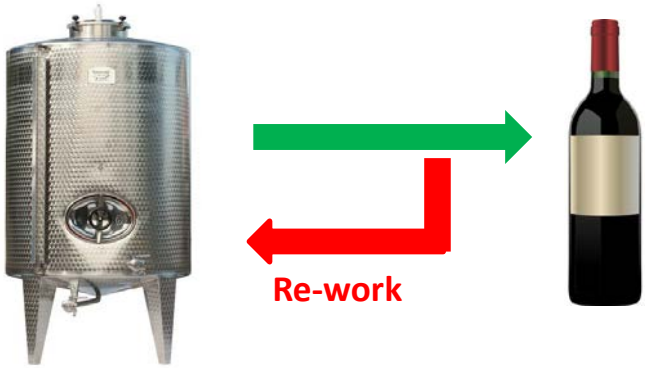
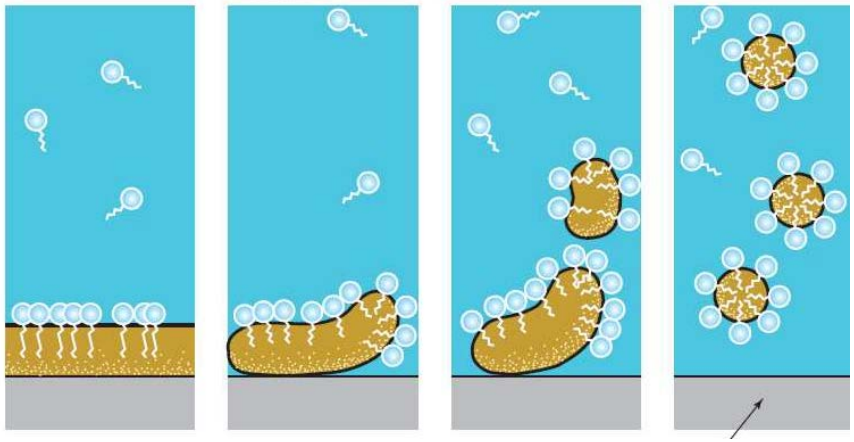


Image Source(s):
https://www.awri.com.au/information_services/enews/2017/07/24/enews-july-2017/

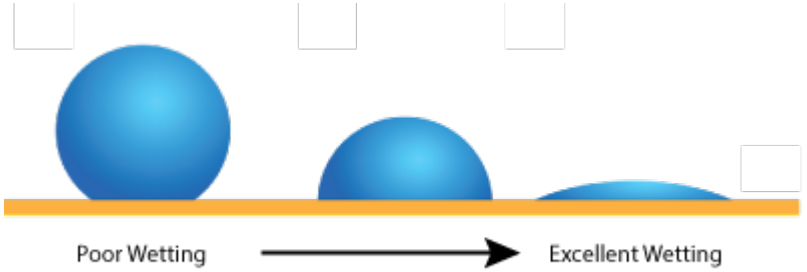
Effective Cleaning Processes

- **Chemistry** of cleaning products is <u>critical</u> for:
  - Fast wetting of soils and surfaces
  - Rapid soil dissolution and removal from surface
  - Low corrosivity for equipment longevity
  - Sanitation

Sinners Cycle



Surfactant action in soil removal



Improved surface coverage with wetting agents

Image Source(s):
http://www.atescoindustrialhygiene.com/blog/cleaning_factors/
http://www.lankem.eu/wetting-agents.html

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Effective Cleaning Processes

- **Mechanical action**
  - Water pressure
  - Water volume / flow rate
  - Surface Coverage
  - Flow through pipes, transfer lines and equipment
  - Static or dynamic spray ball

Sinners Cycle

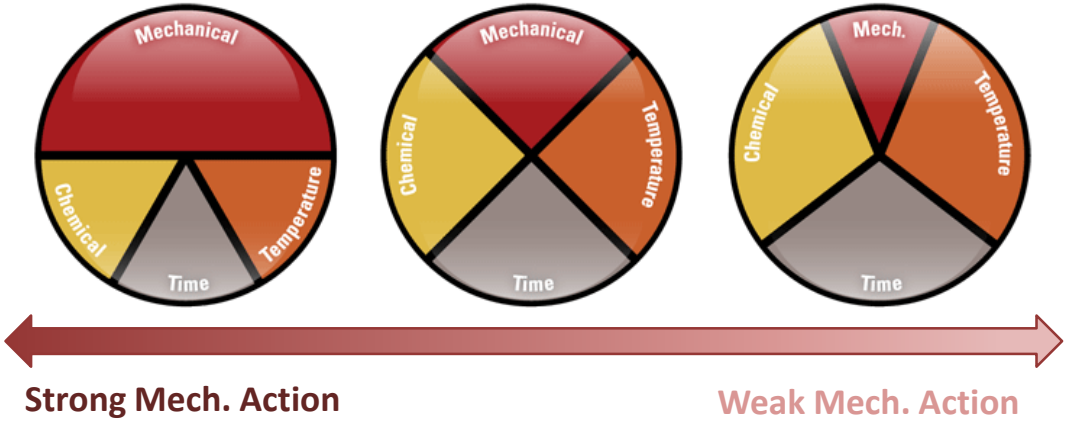
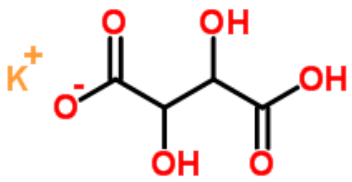
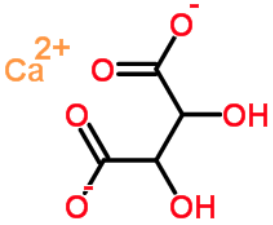


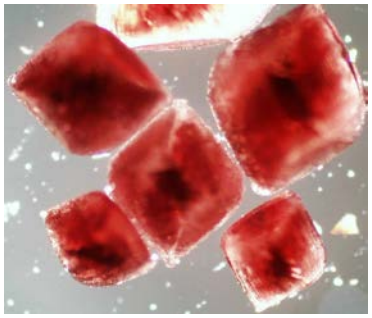
Image Source(s):
http://www.atescoindustrialhygiene.com/blog/cleaning_factors/
http://www.corrosionfluid.com/rotary-impingement-tank-cleaning-vs-spray-balls.aspx
http://texasprocesstechnologies.com/store/page132.html

Common Tank Soiling

- Crystal deposits (cold stabilization)
  - Potassium hydrogen tartrate (top image)
  - Calcium tartrate (middle image)
- Protein deposits (bottom image)
- Tannins/polyphenols and other coloured soils
- Metal salts of other components and various phytochemicals
- Lees / Must / By-Products

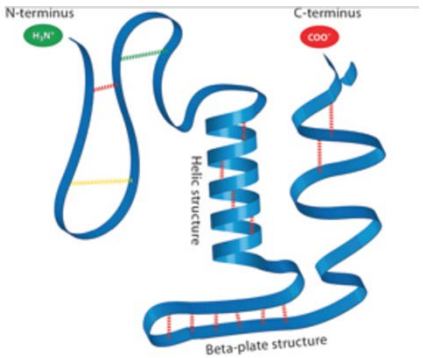


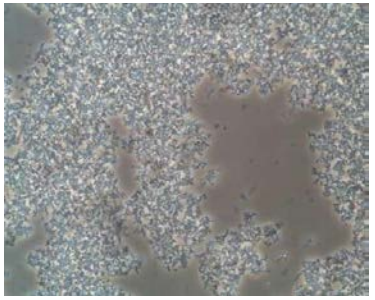




Potassium hydrogen tartrate

Calcium Tartrate





Protein Deposit

Image Source(s):
https://www.awri.com.au/industry_support/winemaking_resources/fining-stabilities/hazes_and_deposits/picture_gallery/#CaTcrystals
http://www.chemspider.com/

Tank Cleaning

- **Non-formulated** caustic products can remove tartrates but less effective on heavy build-up and complex deposits, with no scale control or enhanced wetting.
- **Formulated alkaline** products deliver:
  - Removal of heavy tartrate
  - Fast soil and surface wetting
  - Sequestration of Ca/Mg ions
  - Low foaming and easy rinsing for CIP applications
  - Environmental benefits

- **Destaining** products are primarily used for removal and de-colouring of:
  - Protein
  - Tannins
  - Other conjugated polyaromatics

Image Source(s):
http://wineshopathome.com/wp-content/uploads/2015/06/wine-tank-small.jpg

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Environmental Impacts

- Water management and recycling! Effective products mean reduced consumption.

- Excess sodium is toxic to plants in general
  - **Sodium** – competition with K, Ca, Mg, NH_4
  - **Chloride** – competition with NO_3, PO_4 , SO_4
  - Accumulation in plant leaves

- **Potassium Plus** – Na/K blended product to reduce SAR (sodium absorption ratio). Also contains wetting agents, for enhanced surface coverage and cleaning, plus sequestrants for scale control.

Sodium Toxicity

Chloride Toxicity

Image Source(s):
http://www.floraldaily.com/article/6216/Role-of-sodium-and-chloride-in-plant-culture

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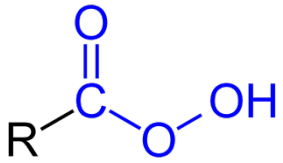
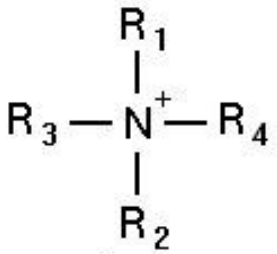
Sanitation

- What can you achieve by ensuring correct sanitation?
  - Quality, consistency and product safety
  - Aging potential
  - Retention of positive flavours

Certified System™
Quality
ISO 9001

- Dominant provide a range of options for sanitation that include:
  - Peracids
  - Acid-based
  - Detergent–based (higher generation QACs)
  - Other chemistry





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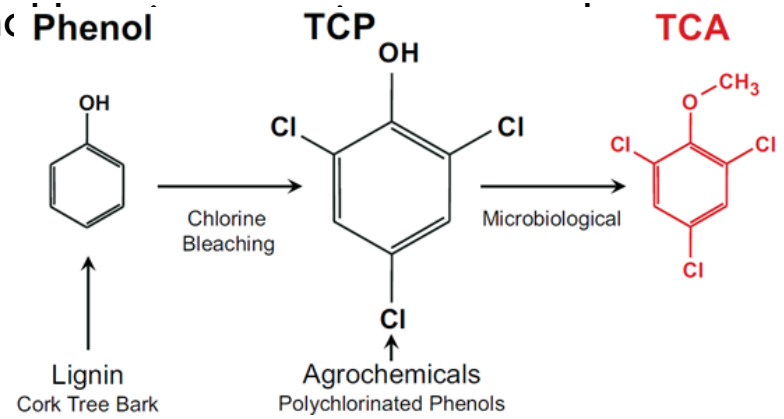
Sanitation – Cork Taint

- Historical sanitiser in wineries – Sodium Hypochlorite (NaOCl)
- Sodium hypochlorite or other halogen based oxidisers (I.e. iodophors) cause **cork taint**
  - Main contributor is trichloroanisole (TCA) – musty, wet dog or low aroma
  - **Halogenation** of polyphenols from the cork, with hypochlorite, form trichlorophenol (TCP).
  - **O-methylation** of the chlorinated phenol to problematic trichloroanisole (TCA)



- *Human detection threshold = 1ppt (1ng/L)*
- *Affects 3-5% of finished wine*

Flavour Taint

- Microbiological contributors to flavor tainting can cause the following effects:
  - Sensory loss
  - Spoilage
  - High volatile acidity (VA)

Control of microorganisms is critically important

Reduce batch contamination

Flavor tainting

Minimise cost of final re-work by winemakers

Yeast

- Saccharomyces Cerevisae
- Brettanomyces Bruxellensis

Bacteria

- Oneococcus Oeni
- Lactobacillus Brevis
- Pediococcus Pentasaceus

Image Source(s):
http://bioinformatics.charite.de/mvoc/

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Sanitation Case Study - **Oxypower**

- All the benefits of Peroxyacetic acid in a convenient powdered form
- Safe and easy to use
- Decomposes to acetic acid and water
- Contains additional wetting aids, sequestrants and secondary sanitising aids.
- Neutral pH: 8.5 – 9.0 @ 1% w/w in water
- Independently verified to be effective against common wine and food spoilage organisms

Thank you for your time

Please stop by our stand in the Exhibitor Area

Damien Rankine
R&D Manager

Dominant®

The R&D Team at Dominant

- HQ in Brompton – close to the Adelaide CBD
- Four full-time chemists on-site
- Fully-equipped R&D Laboratory conducting:
  - New product R&D and formulation for a broad range of industries
  - Chemical and physical characterization
  - Quality control (QC) testing
  - Technical customer support
  - Formulation of liquids, powders and tablets