

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

Damien Rankine Ph.D., B.Sc. (Hons)  
*Research & Development Manager*

WEA Conference – September 2017

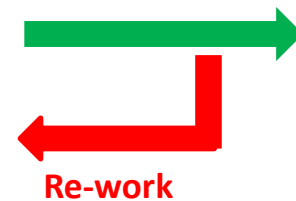
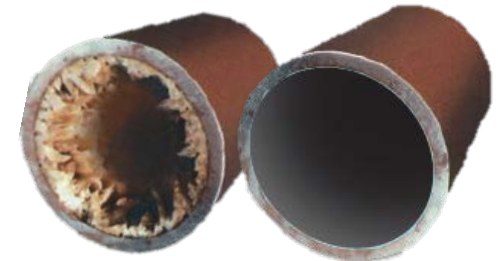
# What's the Point?

- **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!

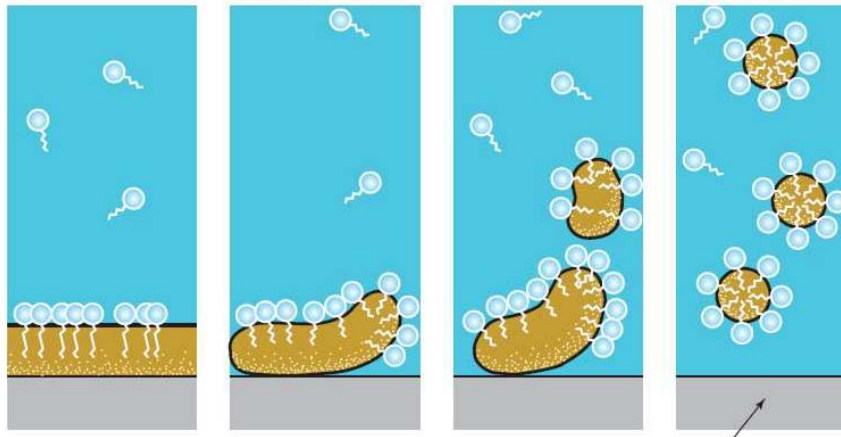


# Effective Cleaning Processes

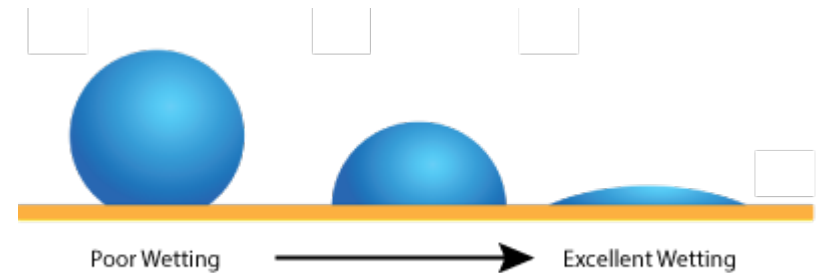
- **Chemistry** of cleaning products is critical for:
  - Fast wetting of soils and surfaces
  - Rapid soil dissolution and removal from surface
  - Low corrosivity for equipment longevity
  - Sanitation



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.atescoindustrialhygiene.com/blog/cleaning_factors/)  
<http://www.lankem.eu/wetting-agents.html>

**Dominant**<sup>®</sup>

# Effective Cleaning Processes

- **Mechanical action**

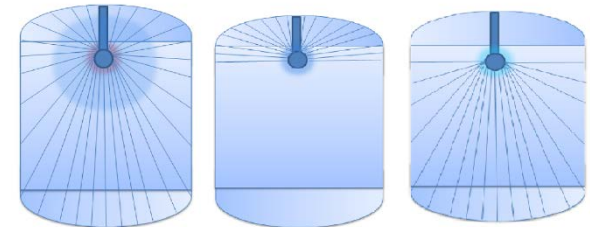
- Water pressure
- Water volume / flow rate
- Surface Coverage
- Flow through pipes, transfer lines and equipment
- Static or dynamic spray ball



**Sinners Cycle**



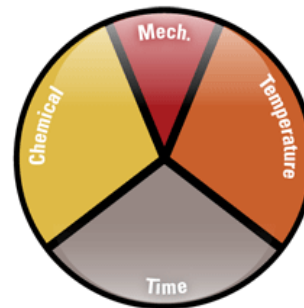
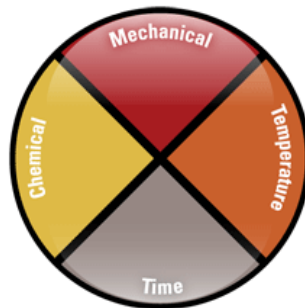
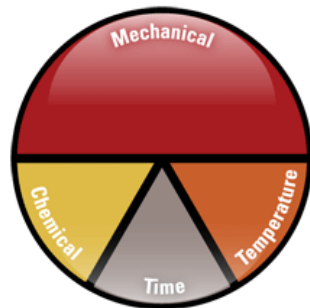
SPRAY COVERAGE



360°

180° Up

180° Down



**Strong Mech. Action**

**Weak Mech. Action**

Image Source(s):

[http://www.atescoindustrialhygiene.com/blog/cleaning\\_factors/](http://www.atescoindustrialhygiene.com/blog/cleaning_factors/)

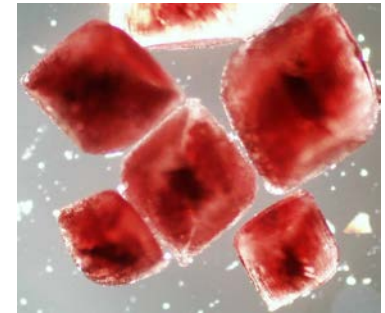
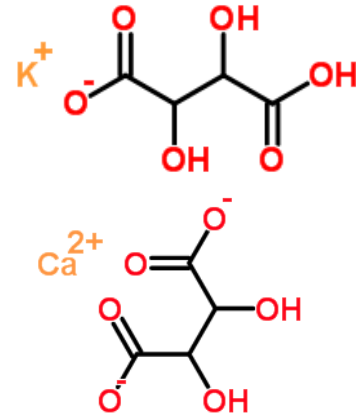
<http://www.corrosionfluid.com/rotary-impingement-tank-cleaning-vs-spray-balls.aspx>

<http://texasprocesstechnologies.com/store/page132.html>

**Dominant<sup>®</sup>**

# Common Tank Soiling

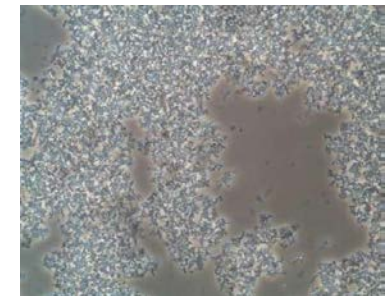
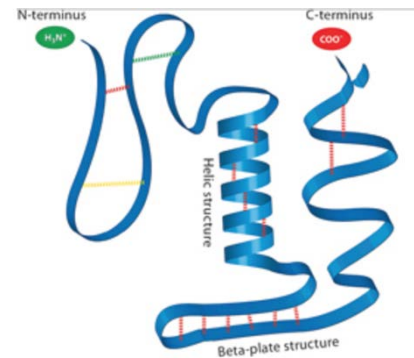
- Crystal deposits (cold stabilization)
  - Potassium hydrogen tartrate (top image)
  - Calcium tartrate (middle image)
- Protein deposits (bottom image)
- Tannins/polyphenols and other coloured soils
- Metal salts of other components and various phytochemicals
- Lees / Must / By-Products



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](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

# 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,  $\text{NH}_4$
  - **Chloride** – competition with  $\text{NO}_3$ ,  $\text{PO}_4$ ,  $\text{SO}_4$
  - 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



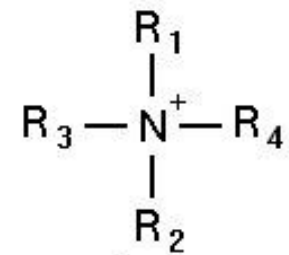
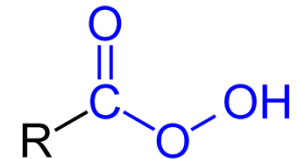
Chloride Toxicity

# Sanitation

- What can you achieve by ensuring correct sanitation?
  - Quality, consistency and product safety
  - Aging potential
  - Retention of positive flavours
  
- Dominant provide a range of options for sanitation that include:
  - Peracids
  - Acid-based
  - Detergent-based (higher generation QACs)
  - Other chemistry

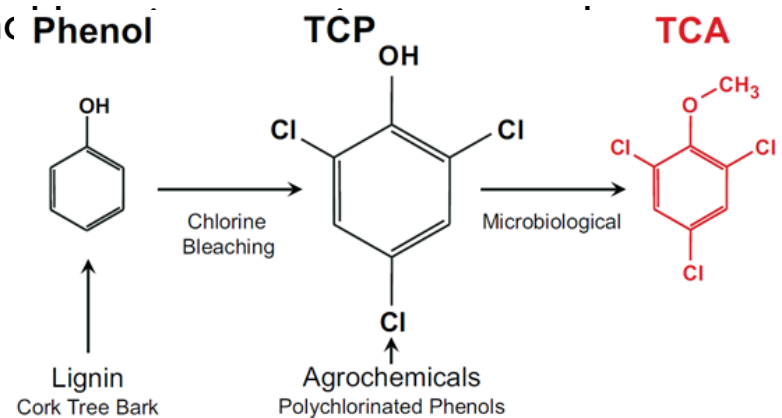


Quality  
ISO 9001



# Sanitation – Cork Taint

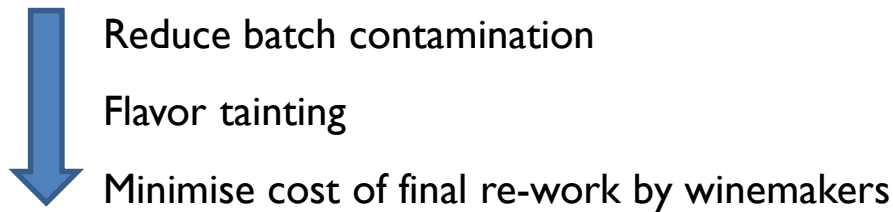
- Historical sanitiser in wineries – Sodium Hypochlorite (NaOCl)
- Sodium hypochlorite or other halogen based oxidisers (i.e. iodophors) cause **cork taint**
  - Main contributor is trichloroanisole (TCA) – **musty, wet dog** or **low aroma**
  - **Halogenation** of polyphenols from the cork, with hypochlorite,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



## Yeast

- *Saccharomyces Cerevisiae*
- *Brettanomyces Bruxellensis*



## Bacteria

- *Oneococcus Oeni*
- *Lactobacillus Brevis*
- *Pediococcus Pentasaceus*



# 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**<sup>®</sup>

# 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

