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

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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):
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.lankem.eu/wetting-agents.html
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

Image Source(s):
http://www.atescoindustrialhygiene.com/blog/cleaning_factors/
http://texasprocessstech.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

Image Source(s):
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):
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.

Image Source(s):

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
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 by microorganisms create the problematic trichloroanisole (TCA)

• Human detection threshold = 1 ppt (1 ng/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

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