Brettanomyces prevention

- Use SO_2 at crush
- Sanitize or sterilize new barrels
- Clean surfaces and containers thoroughly
- Employ microbial monitoring
  - Test all barrels and tanks initially and periodically
  - Filter and SO_2 if found
  - Remove contaminated cooperage

Brettanomyces cure

- No known cure for odor
- Low level can be tolerated or even desired by some

Generation of Cork Taint

- Mold by-products, usually *Penicillium and Apergillus* species
  - 2,4,6-trichloro anisole (TCA)
    - Produced in presence of chlorine
    - Extremely low olfactory threshold (ppt)
    - Diminish other aromas at less than threshold
  - guaiacol, geosmin, 2-methylisoborneol (MIB), octen-3-ol and octen-3-one

Prevention of Cork Taint

- Avoid use of chlorine cleansers in winery
  - Peroxyacetic or ozone substitution?
- Avoid storage of moldy wood or other fiber in winery
- Avoid penta-treated wood and chlorinated insecticides near wine
- Use certified corks
- Use non-cork closures

Cure for Cork Taint

- Research into specific binding agents for removal ongoing

SO_2 Usage

- Activity pH dependent
- Free SO_2 bound by oxidants and sugars
- Crush
- Post-fermentation or stop fermentation
- During storage
- Freshen wines
- Bottling
- Sanitation

SO_2 & Settling At Crush

- Depends on grape condition
  - pH, contamination, ripeness
  - 0 to 100 ppm
  - Major part binds to skins and must settlings
- Inhibits microorganisms before yeast added
- Add to crusher, pressed must, or tank must
- Chilling must can be done B4 fermentation
  - Rack off lees and ferment

SO_2 at End of Fermentation & During Storage

- Combine with chilling to stop prematurely
  - Leave residual sugar
  - Rapid chilling and 90 to 125 ppm SO_2 to stop
  - Rack off and maintain SO_2 at 60 to 80 ppm
- Add when racking to dry fermented
  - 30 to 50 ppm
  - Maintain during storage
    - Check frequently and after handling

SO_2 Binds Wine Components

- Can use to bind H_2S and acetaldehyde and other aromas $\Rightarrow$ freshens wine
- Binds with oxygen
- Binds with anthocyanins and phenolics
- Binds with sugars

Filtering, Fining, Chilling and SO_2 Prior to Bottling

- Fining and/or filtering can be done prior to aging in stainless or barrels or B4 bottling
  - May change texture of wine
  - Early filtration lessens chances of spoilage
  - Fining, filtering B4 or during cold break
- Add SO_2 to tank to inhibit MO's
  - 35 to 100+ ppm, depending on residual sugar
- Add SO_2, filter prior to or during bottling
  - Filter and aeration removes some SO_2
  - Bottle rinse may leave some SO_2

SO_2/Citrate for Sanitation

- Keep fresh solution handy in barrel for rinsing hoses, fittings, containers, etc.
- SO_2 combined with citrate makes good sanitation mix or barrel sanitation
  - Sanitation rinse
    - 3 g KMS + 6 g citrate/gallon good solution: pH 3.0
  - Barrel storage
    - Long term: rinse and burn sulfur stick in barrel
    - Short term: H_2O + (45g KMS + 90g citrate)/barrel

TANK AND BARREL MANAGEMENT

Giving Your Wines a Good Home

Stephen Menke
Penn State Enology Extension Educator

TANK AND BARREL CONSIDERATIONS

- Capacity
- Diversity
- Cleaning
  - Soil removal
    - Bases, Acids, Detergents
- Sanitation
  - Surface
  - Deep

General Principles of Tank and Barrel Management

- You can never have too many tanks
  - Enough start-up tanks for first two years; plan for 1, 2, 3 years
  - Various sizes, some variable capacity, 20% total extra capacity
- You can have too many barrels or barrels too soon
  - Start barreling wines when you do not need volume for quick sale
- Stainless tanks are not a luxury, they are efficient over time
  - Man ports, racking port, thermometer
  - Temperature controlled fermentation tanks favor quality control
- Plan tank placement for easy work flow and cleaning
- Tank sanitation is paramount

Purposes of Cleaning, Sanitizing, and Sterilizing Tanks

- Get rid of microorganisms
- Get rid of nutrients and contaminating compounds
- Prevent entry and build-up of microorganisms and other contaminants

Tank Cleaning and Sanitation

- Clean and sanitize before filling and after emptying
  - Clean immediately or it won't get done properly
- Solublize surface soil layer and scrub it off
  - Base, acid, physical removal
  - Cleansers make soilants hydrophilic (salts) or amphipathic (micelles), so water can carry them
  - Acid, base, or neutral detergents
- Pressure wash to remove final soil layer and soap
- Sanitize surface
- Sterilize surface as necessary before re-using
- If not re-using, rinse with clean water and air-dry

Types of Tank Surface Soilants

- Larger, looser particles
  - Removed with liquid rinse and/or detergents
- Tightly bound crusts, greases, films
  - Use physical scouring and/or stabilized cleansers (non-ionic, cationic, anionic)
- Impregnated soils
  - Strong oxidizing cleansers, with or without heat
- Non-soil microorganisms
  - Remove with sanitation and/or sterilization

Types of Cleansers

- Cleansers are Surfactants
  - Surface active reagents, like organic enzymes and detergents
- Enzymes
  - Dissolve specific compounds under specific conditions
- Ionic surfactants
  - Cationic positively charged in water
  - Anionic negatively charged in water
  - Usually disassociate in water
- Non-ionic surfactants
  - Do not easily dissociate in water

Types of Ionic Cleansers

- Alkaline detergents
  - Caustic
    - Contains sodium hydroxide or potassium hydroxide
    - Very strong cleanser and saponifier
  - Mild
    - Contains sodium, potassium, ammonium salts of phosphates, silicates, carbonates, borates
- Acid detergents
  - Contain organic or inorganic acids, strong to weak
  - Soften and remove mineralized layers
- Alkaline and acid detergents often used sequentially