Napa Valley College, Viticulture and Winery Technology
Standard Operation Procedure
Fermentation Monitoring SOP
Fall 2010

I. Introduction

During the fermentation of red and white wines, many decisions are driven by fermentation monitoring. For example, nutrient additions may be timed based on the progress of fermentation, temperature may need to be adjusted or fermentation may need to be intentionally halted. Additionally, fermentation monitoring may alert the winemaking staff to potential problems such as stuck fermentation or sensory defects.

II. Potential Hazards

- Inert gas: Inert gas will be present in the headspace above a fermenting wine and can cause rapid suffocation.
- Mercury contamination: Mercury containing thermometers, if broken, can leak their mercury which is highly toxic. Not only is this a danger to the worker, but if it comes in contact with wine, the wine must be destroyed. Report all mercury leaks. Mercury containing thermometers are only to be used in the lab, they should never be taken into the cellar.
- Clinitest tablets react strongly with moisture and can cause burns if they come in contact with skin. Additionally, the test tubes will become hot during the reaction.

III. Personal Protective Equipment

- Safety glasses – especially during Clini-test analysis

IV. Process Equipment

- Bucket of quaternary ammonia. Make fresh daily at rate of 10 mls quat per gallon of H2O
- Large sanitized beaker, preferably plastic
- 250 ml plastic hydrometer cylinder
- Hydrometer
- Thermometer (unless the hydrometer is a thermo-hydrometer)

V. Pre-operation preparation

- Familiarize yourself with the wine style guidelines for each lot of wine.
- Refer to NVC sanitation procedures
- Check the lot book for the last Brix reading, this will tell you what range of hydrometer to use

VI. Procedure

- Sampling

Exact sampling procedure will vary depending on the container that the wine is fermenting in and whether it is a white wine (fermenting as juice) or a red wine (fermenting as must). For white and red wines in tank, this begins by sanitizing the sample valve or racking valve of the tank. Since you will need to sanitize your beaker anyway, a good method for doing this is to fill your beaker with quat, splash it on the valve, then rinse both the valve and the beaker.

If you’re doing a pumpover, simply pull the sample from the end of the hose or the pumpover cart a few minutes into the pumpover.
White wines in vari-tanks should usually be pulled with a sanitized wine thief from the top. Most valves on vari-tanks are too low to get a representative sample. Use caution for inert gas above the ferment.

For red wines in bins or other containers, sanitize a beaker and a small strainer. With the strainer placed over the top of the beaker, push the beaker into the cap so that wine filters into the beaker. Remember; for this method the outside of the beaker must be kept as sanitary as the inside.

- Testing brix and temp

If sample is being returned to ferment, every piece of equipment that touches the wine must be kept sanitary. Check the temperature first because it will change once the sample is at room temperature. Record reading in Fahrenheit in the lot book. If thermometer is Celcius, then convert it. Check the lot book and look at previous readings to determine the correct range of hydrometer to use. Pour sample into a 250 ml graduated cylinder up to about 2 inches below the top. Float the thermometer, giving it a little spin to keep bubbles from sticking. Read the hydrometer soon after floating it, because as bubbles cling to the side of the glass the hydrometer will begin to float. For a very foamy sample, you can move the whole mess over the sink and fill the cylinder with the hydrometer in it until it over-flows, then blow off the foam. Refer also to elaborated hydrometry procedures in the lab procedures manual. Record reading in lot book. Note: Make all lot book record in pencil!

- Sensory analysis

Pour a small sample in a wine glass so that you can smell it and taste it. You can note interesting sensory characteristics in the lot book. Most importantly, take note of any defects. The most common defects during fermentation are: Hydrogen sulfide (H2S) which smells like rotten eggs, and Volatile acidity (VA) which smells like acetone or other unpleasant smells. Notify the winemaker or assistant winemaker of any serious defect.

- Testing residual sugar with Clini-Test

This test should be performed when the wine appears to be dry by hydrometer, or in the less-common event that a wine is to be intentionally “stuck” with residual sugar. Wine appears to be dry by hydrometer when the brix readings stop dropping. Note: wine does not go dry at zero brix due to the distorting effect of alcohol. Most wines go dry between -.8 and -2.0.

Put 20 or 30 mls of wine into a small beaker. Since this wine will not be returned to tank, it is not necessary to sanitize this equipment. Draw .5 mls of sample using either: a volumetric syringe, a disposable plastic pasteur pipette, or a 1.0 ml volumetric pipette. Put the sample into the glass test tubes that are in the Clini-Test basket. Carefully cut open a clinitest tablet package using scissors and drop the tablet into the test tube without touching the tablet. Do not hold the tube during reaction as it will become hot. 10 seconds after reaction is finished, you can swirl the test tube gently and compare the color with the color on the laminated charts. Record reading in book as: % rs by pill.

VII. Clean-up

- If a lid was removed from a red fermenter during sampling, then the most important item in clean-up is returning the lid in a timely fashion.
- If sample has been maintained in a sanitary fashion, and has not been left out for too long in open air, it can be returned to the tank. Otherwise, discard it.
- Rinse sample valves with water.
- Clean all laboratory equipment and hydrometers with water and put away.
- Hydrometers and thermometers always go in their special racks, not the dish racks