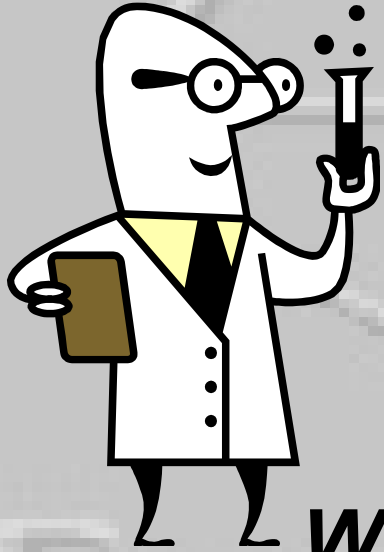


PRESQUE ISLE WINE CELLARS WINE SCHOOL



Presents

Winemaking 201 - Intermediate

Kris Kane kkane@piwine.com – PIWC Winemaker
Presque Isle Wine Cellars Staff
www.piwine.com

Class Goals

- To further develop techniques and practices
- Hands on practice and understanding of basic instruments
- Enhance your winemaking experience

Overview

- Demonstration and discussion of
 - Acid testing
 - pH testing
 - Sulfite testing
 - Sugar testing
- New test kits- pocket labs (AccuVin)

Total Acidity (TA)

- Measures all the acids in the wine
- Also known as “titratable acidity” because analysis is carried out by titration
- Result has to be interpreted with care because it measures all acids
- United States uses tartaric acid as the unit and is in mg/l
- French use sulfuric acid (battery acid)

TA - continued

- Of big interest to winemakers at the early stage because it is then that the first adjustment can be made
- Also largely done due to its simplicity
- Grapes – tartaric acid & malic acid
- Fermentation produces other acids

TA

- Testing Procedure
 - Pipette used to measure portion of wine
 - Titrate standardized alkaline solution until resultant is neutralized
 - Known as endpoint
 - Endpoint is detected by using an indicator solution
 - Indicator solution is a substance that changes color when the acid is neutralized

TA

- pH meter is used to detect endpoint giving greater accuracy
 - Titrate until you reach a pH of 8.2
- Especially important when titrating red wines
- When endpoint is reached, take answer and multiply by 0.15 to give TA



TA demonstration using Syringe Acid Test Kit (SACK)

PRESQUE ISLE

WINE CELLARS

Other Types of Acid Tests Kits



9/11/2013

© 2007 Presque Isle Wine Cellars, Inc.

Now I Know My TA, What Do I Do?

- Acidification - addition of acid
 - Usually needed for hot climate fruit, usually from California
- Deacidification - reduction of acid
 - Usually needed for cooler climate fruit, east coast

Acidification

- Easier of the two processes
 - Just a physical addition of acid
- Tartaric acid – natural acid of grapes first choice for acidification lowers pH
- Malic Acid – good for other fruits such as apples or cherries raises pH
- Citric acid – if used, better post fermentation; can be converted by yeast to acetic acid (VA)

Acidification example

- We have 5 gal of California Merlot at TA of 0.44mg/l want to be at 0.64mg/l
We know that 3.7grams of tartaric acid per gallon would raise acid .1mg/l
- $0.64 - 0.44 = 0.2\text{mg/l}$, then take $(2 \times 3.7) = 7.4$ grams per gallon to raise TA by 0.2mg/l
- 7.4×5 gallons = 37 grams needed
- Demo high acid wine

Deacidification

- More difficult due to the fact that acid cannot be physically removed
- Chemically is simple, but not as simple as just adding product
- Actually neutralizing acid by chemical reaction

High Acid

- High Acid (common in cooler growing regions)
- Deacidification - many options before fermentation
 - Calcium Carbonate - use as early as possible only good for a 0.3 - 0.4 drop
 - Potassium Bicarbonate - can be used later on in process but best if early on; better results if used in combination with cold stabilization
 - Amelioration – addition of water (refer to hand out)
- Both increase pH so a 0.3-0.4 drop is the biggest you want to go

Amelioration

The cutting of high acid must with a sugar and water solution.

- **Formula Step 1:**

$$\frac{(\text{Gal(s) of must or juice}) \times (\text{Starting Acid})}{(\text{Desired Acid})} = \text{Total Gallons Must or Juice}$$

- **Step 2:**

$$(\text{Total Gal.}) - (\text{Starting Gal.}) = \text{Total Gal. H}_2\text{O Addition}$$

- **Step 3:**

$$(\text{Total Gal. H}_2\text{O Addition}) \times (1.7) = \text{lbs. of sugar to add to H}_2\text{O (Result=20.8 Brix Sugar Water)}$$

Amelioration - continued

- Desired acid must not be greater than 35% without greatly diluting your wine.
- Sugar and water solution will become a larger volume than previously calculated for total gallons of water addition. The sugar will increase the volume by .075 gallons per lb. of sugar
- We have five gallons of juice at 1.31 TA and want 0.96 TA
- $\frac{(5\text{gal})(1.31)}{0.96} = 6.82$ this will be the total volume we end up with in the end

Amelioration - continued

- Take (new volume 6.82 gal) – (5 gal original volume) = 1.82 gallons this is the total amount of water needed to bring the acid down to .96
- We now need to take that 1.82 gallons of water and adjust it to 20 brix (1.7 pounds/gallon of water = 20° brix)
- So $(1.82) \times (1.7) = 3$ pounds of sugar needed to be added to the water
- We stir this all up and will add this to our original 5 gallons in a 7 gallon carboy
- You will end up with extra sugar water solution in that the sugar will increase the volume by .075 gal per 1 pound
- Make the sugar water solution in a side container and then add back

pH

- Defined as the negative of the log to base 10 of the concentration of hydrogen ions, or $\text{pH} = -\log_{10}[\text{H}^+]$
- However, for winemaking, understanding of basic principles is all that is necessary
- pH on a scale of 0-14, 0 = very acidic, 14 = very alkaline, and 7 is neutral (pure water)

pH

- Wine falls between 2.8 and 4.0 range in wines is small but a 0.2 difference are important
- For non-scientist pH is a tough concept to grasp
- Is an indication of acidity yet not the same as total acidity
- Works inversely with TA
- Comes from the French *pouvoir hydrogene* means “hydrogen power”

pH

- Very important because it affects
 - Color
 - Taste
 - Keeping qualities in relation to sulfur dioxide
- Measurement is extremely easy by using a pH meter
- pH meter greatly increases accuracy of TA testing titrate until you reach pH of 8.2

pH Instruments/Demonstration

- Measures the hydrogen ion concentration
- Uses a probe that is immersed in the liquid
- Probe needs to be restandardized daily
 - Use buffer solutions that are close to the numbers you are looking for

Sulfur Dioxide

- Most useful of all additives
- Toxic in large doses
- Harmless when used at correct level
- Also found in other foods such as
 - Dried fruit, fruit juices, fresh fruit salads, sausages, peeled potatoes and many others
- Has some disadvantages
 - Allergic reaction with some asthmatics
 - Can bleach color out of red wine, and reduce fruit flavor

Sulfur Dioxide

- So use sparingly
- Universal additive because of four distinct properties
 - Antioxidant-prevents oxidation
 - Antiseptic-kill bacteria
 - Anti-oxidasic- poison to enzymes that cause oxidation (browning of apples)
 - Refresher- can refresh a slightly oxidized wine

Sulfur Dioxide

- We use Potassium Metabisulfite as the carrier of sulfur dioxide
- Most important to know and maintain the amount of free SO_2
- Takes around 0.3 grams/gallon to achieve 50ppm which is usually a safe level

How to Test

- Free SO₂ kits uses the ripper method
 - Simple quick and stable
 - Usually within (+/-) 2-10ppm of free sulfur
- Aeration Oxidation
 - Complex test with set up time and need of extensive equipment
 - Highly accurate within +/- 0.5-2 ppm

Demonstration of SO₂ test

- Place plastic tip on pipette
- Put in wine and draw up liquid
- Draw liquid until color in vial matches color of wine
- Turn over and read amount of SO₂ present

Example

5 gallons of wine with a 30 ppm SO₂ reading we want to have 60ppm for before bottling

- Subtract actual ppm from desired ppm
- Using formula we want a 30 ppm addition
- $(\underline{5\text{gal} \times 3.785 \times 30\text{ppm}}) = 1\text{g of Kms}$
needed 570

Sugar Measuring

- Measurement of sugar using the Balling scale and using brix as a unit of measure
- A measurement of total soluble solids
- Can use a hydrometer or a refractometer
- Hydrometer- measures density of liquid
- Refractometer- uses reflection of light

Measuring of Residual Sugar

- Cannot use a hydrometer because alcohol is less dense than water and interferes with the reading
- Other options
 - Clinitest- tablets that heat up and measure the amount of reducible sugars
 - Let reaction occur and compare to color chart
- Demonstration using Clinitest



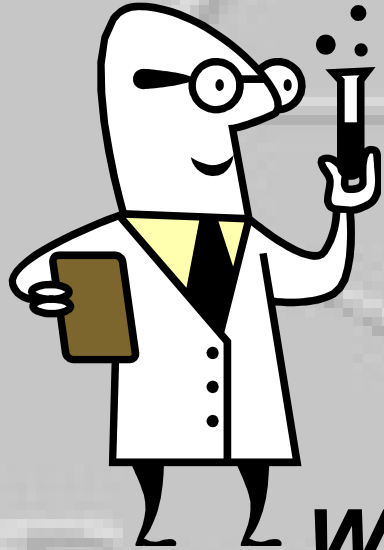
**New Product –
Pocket Lab Kits**

PRESQUE ISLE
WINE CELLARS

9/11/2013

© 2007 Presque Isle Wine Cellars, Inc.

PRESQUE ISLE WINE CELLARS WINE SCHOOL



Presents

Winemaking 201 - Intermediate

Kris Kane kkane@piwine.com – PIWC Winemaker
Presque Isle Wine Cellars Staff
www.piwine.com