

Determination of Titratable Acidity

Titratable Acidity (TA) is an index that represents the total amount of organic acid in a sample of wine (primarily tartaric, malic and citric acid). Since tartaric acid is the most prevalent acid in wine grapes, TA is usually expressed as if all of the acid in a sample is tartaric acid. The TA of wine made from warm climate *Vinifera* grapes usually varies between 6 and 9 g/L. Wines below this range will usually be perceived as flat with no refreshing value; and often benefit from the addition of tartaric acid. Wines above this range are typically perceived as excessively tart. Cold climate grapes (especial American hybrids) can produce musts with TA values approaching 15 g/L. Unfortunately, it is difficult to reduce TA in the winery without negatively influencing other sensory dimensions of the wine.

Procedure

- a. Calibrate pH meter.
- b. Collect 10ml sample of wine to be analyzed. If must or very young wine, filter it with coffee filters.
- c. Add 30ml of distilled water to a 50ml beaker (For optimal accuracy, water should have been previously boiled for 15 min to reduce CO₂ levels which can elevate apparent TA).
- d. Add 3 drops of phenolphthalein indicator (Although using a pH meter, it's useful to learn how the color changes at the endpoint of the titration).
- e. Add approximately 2-3ml of filtered wine to the same 50ml beaker.
- f. Add magnetic stir bar and place beaker on magnetic stirrer.
- g. Submerge pH electrode into contents of beaker (maintaining clearance above the stir bar).
- h. Quickly titrate contents of beaker to establish pH=8.2 endpoint.
- i. Volumetrically add **5ml of wine sample** to the beaker.
- j. Record current level of NaOH in the buret.
- k. Titrate test sample of wine back to the pH=8.2 endpoint and record required ml NaOH.
- l. Calculate total NaOH used and compute TA as follows:

$$\begin{aligned} \text{TA (g/L tartaric)} &= (\text{ml NaOH})(N \text{ NaOH})(150 \text{ g/mol})(0.5 \text{ mol/eq.}) / (\text{ml wine sample}) \\ &= (\text{ml NaOH}) * 1.5 \end{aligned}$$

Notes:

(1) %TA (g/100ml) = TA (g/L) / 10

(2) Dissolved CO₂ is acidic at wine pH levels. Hence, significant amounts of CO₂ in a wine sample can artificially elevate estimated TA. Theoretically, the CO₂ level of a table wine reaches saturation at 1.5 g/L (20° C). This corresponds to an elevation of 2.6 g/L in the TA estimate (Boulton, Singleton & Bisson, 1998; p.434). Since wines just finishing alcoholic or malolactic fermentation are typically *supersaturated* with CO₂, this erroneous elevation in estimated TA could be even greater under some circumstances. Hence, it is prudent to “degas” your wine samples prior to measuring TA and/or pH.

Apparatus and Materials

Orion 230A pH meter; pH electrode
pH calibration buffers (4 and 7)
10ml buret
magnetic stirrer and stir bar
5ml volumetric pipette

50ml beaker
lab stand and miscellaneous clamps
0.1 N NaOH solution (fresh or “standardized”)
phenolphthalein indicator solution
boiled (then cooled) distilled water