



Tartrate Removal Methods in Wine and the Role of Conductivity

Tartrates are naturally occurring crystals that often form in wines and may be considered undesirable to most customers. To most people, tartrates resemble small pieces of cut glass or diamond like crystals that form on the cork and as sediment in the wine bottle. The crystals are formed from potassium bitartrate, a naturally occurring organic acid, which is found in many plants including grapes. Tartaric acid actually plays two important roles in the winemaking process by keeping pH low enough to prevent spoilage bacteria from growing and to act as a preservative after fermentation.

To most wine enthusiasts, tartrate crystals pose no serious problem. They are, in fact, considered to be part of a quality wine that hasn't been overproduced. Even though tartrate crystals are harmless, their presence may lead to a more "tart" tasting wine that is less desirable to some enthusiasts. Customers have been known to return shipments of good wine that have the presence of these crystals.

Processes for tartrate removal are cold stabilization, chemical additives or grape/vine management practices. Grape management is a less intensive method and includes extended hang time where the grapes are left to sit on the vine until they are nearly raisin-like. This method typically reduces the taste of tartaric acid and makes the wine smoother, but may also make the wine potentially less compatible with food. During cold stabilization, the temperature of the wine is lowered to about -4°C to 0°C after fermentation for a period of 1-2 weeks allowing the crystals to precipitate out. Once conductivity reaches a stable level, the wine is poured out of the container through a filter, and the tartrate crystals remain behind. This process can be expensive due to refrigeration costs, may take several weeks to complete, is not considered completely reliable, and may affect the colloidal structure which in turn may affect the taste of the wine. Conversely, the chemical process for the removal of tartrate crystals is done by adding meta-tartaric acid to wine after fermentation in order to slow down the crystallization process.

The only alternative to the options mentioned above is the ion selective membrane method. A semipermeable membrane and electro dialysis have been used to remove these unwanted crystals. In this process, an electric current attracts the potassium and bitartrate ions, yet leaves the colloidal structure intact. This method can be more complicated since it utilizes sophisticated equipment and conductivity testing instruments along with process controllers. The scope of this process has limited its application to mostly large wineries, or small vineyards focused on specific quality.



The YSI 3200 conductivity instrument has alarms, connects to a PC, and can program various calibration routines for the winemaking process.

Conductivity is relative to both cold stabilization and electro dialysis because the value will determine whether a certain type of wine is stable, meaning that no further tartrates will form. A conductivity test has been developed by the INRA, the French National Agronomic Research Institute, to determine a test for stable conductivity in wines. The test determines what level of conductivity is required for the stabilization of various types of wine. This test is done by treating a sample of refrigerated wine with potassium bitartrate and measuring the variation in conductivity over time.

Ions are extracted until the wine is considered stable, which has been experimentally determined to be between a 6% and 30% reduction in conductivity, depending on the type of wine.

Conductivity values can also be extremely important in the source water used in the wine making process, since it can determine the purity of the water. Differences in taste and color of wine, beer and whiskey will occur, depending on the quality of the source water being used. This depends on the ionic species present and how they affect overall taste and quality of the wine.

For additional information regarding INRA, please visit <http://www.ameridia.com>

For additional information regarding YSI Products that measure conductivity, please contact us:

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