How should I calculate and make additions of grape concentrate to juice, musts and wines?

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Grape juice concentrate is added to juices and musts when the growing conditions have prevented the grapes from accumulating optimal glucose and fructose concentrations for the desired wine style. It may also be used to adjust the sweetness of a table wine (usually just before bottling) or a sweet or fortified wine (after alcoholic fermentation or during maturation).

Grape juice concentrate is a very viscous material and therefore it is important to ensure through homogenization with the juice or wine to which it is added. Adequate homogenization can be achieved by mixing the concentrate with small volumes of the juice or wine to be adjusted, in one or more stages. A 1:1 mixture is placed in another, smaller tank and carefully mixed by circulation over the top of the tank and between the bottom and racking valves. Another equal volume of the juice or wine can then be added to the small tank and the procedure repeated until the viscosity of the mixture is closer to that of the juice or wine in the main tank. The mixture in the smaller tank can then be transferred to the main tank, followed by thorough mixing. Taking samples at difference depths in the main tank and comparing their specific gravity with each other and with a mixture prepared at the laboratory scale can assess homogeneity of the complete mixture.

The actual volume to add is calculated using Pearson's Square (Rankine, 1991):

$$\text{Volume of concentrate to be added} = \frac{V(D-A)}{C-D}$$

where V = volume of juice or must, D = desired Brix, A = initial Brix, C = Brix of concentrate (1 Brix = 1%).

For example, how much 68% grape juice concentrate do we need to add to 700 L of must to increase the Brix from 20 to 24?

$$\text{L of water required} = \frac{700(24-20)}{68-24} = 63.64 \text{ L}$$

The volume of must is calculated from the tons of grapes multiplied by the expected yield (L per ton) from the press, e.g. if the yield for the press is expected to be 650 L/ton and 3 tons are going to be crushed, the volume would be 650 x 3 = 1950 L.

Just as with water additions, grape heterogeneity and consistency are major sources of error in estimating the initial Brix of a must. It is best to make concentrate additions as early as possible, just before fermentation or during the early stages. Homogeneous mixing becomes very difficult once there is vigorous production of carbon dioxide.

Adding concentrate will change the equilibria in the juice or wine and so pH and titratable acidity will need to be checked and adjusted accordingly. In addition, wines will need to be re-checked for stability with respect to cold and heat and any other fining that may have occurred prior to the concentrate addition. Finally, wines will require sterile filtration to prevent unwanted fermentations occurring.

Reference

RANKINE, B. c. 1991. ***Making good wine,*** Australia, Pan Macmillan Publishers.