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Is Your Wine Breathing Too Much?

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Is Your Wine Breathing

TOO Much?

By: Madison Cooper

Methods:
1. 8 different stoppers: 3 natural corks (mean length: 20mm, 25 mm, 40mm)
2. 2 technical stoppers: 2 synthetic corks (one was extruded & one was melted).
3. 1 metal screw cap with a multilayered liner (Kontoudakis et al.)
4. All bottles were filled to the same level and were sealed at the same time.
5. 8 bottles were tested with each of the 8 stoppers (Kontoudakis et al.)
6. After 24 hours sealed bottles were analyzed and determined for the amount of dissolved oxygen.
7. Bottles were tested with agitation and without agitation for each stopper type (Kontoudakis et al.)
8. Samples of the wine were titrated using a Winkler method to determine the concentration of dissolved oxygen.

Background:

- The amount of oxygen [O₂] absorbed in a wine during storage is one of the main components affecting the quality (color and flavor) of the wine (Kontoudakis et al.)
- Oxidation can lead to positive effects in red wines, such as enhanced color and aroma, but can be detrimental to white wines (Kontoudakis et al.)
- There are certain agents in wines (phenolic acids, flavanols, anthocyanins, acrylic acid, etc.) that can bind with oxygen and produce color changes (browning) and negatively impact the flavor and aroma of the wine (Lambir et al.)

Results:
1. Oxygen concentration in the headspace was lowest for the natural cork that was longest in length (40mm) (Kontoudakis et al.)
2. Differences in the concentration of dissolved oxygen after bottle agitation are directly related to the amount of oxygen that is present in the headspace (Kontoudakis et al.)
3. Alcohol content, pH, volatile acidity, total and free SO₂, and absorbance at 420nm for the wine from each stopper type at bottling, and 6, 9, 12, and 18 months after storage (Lambir et al.)

Methods:
1. 9 different stoppers used: 1 natural cork stopper (N), 1 cork-based technical stopper (ST), 7 synthetic stoppers (52, 53, 54, 55, 56, 57, 58) (Lambir et al.)
2. The inner cellular structure and size were analyzed and recorded using a Philips XL30 ESEM Scanning Electron Microscope prior to wine bottling (Lambir et al.)
3. Alcohol content, pH, volatile acidity, total and free SO₂, and absorbance at 420nm for the wine from each stopper type at bottling, and 6, 9, 12, and 18 months after storage (Lambir et al.)

Results:
1. The type of stopper used to seal the wine was significant when measuring the absorbance at 420nm; this test mainly studied the browning of the wine, meaning the onset of browning varies with different types of stoppers (Lambir et al.)
2. "The natural cork stopper, N, and the cork-based technical stopper, ST, displayed regular networks of cells with diameters smaller than 100μm and the slowest browning kinetics. The stoppers made of plastic materials had wide cellulization ranges and gave rise to faster browning" (Lambir et al.)
3. A more regular cellular structure and smaller cell size, with a minimal range of cell diameters, will increase the instance of slower browning rates during storage (Lambir et al.)