



Preliminary Findings of Nomacorc-backed Research on O₂

Transmission rates, post-bottling chemistry presented

As *Wine Business Monthly* readers may recall, synthetic closure maker **Nomacorc** announced in late 2007 that it would initiate a multi-year project with a number of independent research institutions to collect data to better understand how oxygen transfer through closures influences wine development after bottling.

The company has been sharing initial results from some of the research conducted in Germany and France. Some of the research was presented during the most recent **O2INWINES** Conference in Santiago, Chile. Company representatives also recently briefed winemakers during presentations in Napa Valley.

Results are preliminary but drive home the point that winemaking doesn't end before bottling.

Research at Germany's **Geisenheim Research Center** is measuring the evolution of a Riesling under different bottling and post-bottling conditions. Bottles were filled using two headspace

volumes, each containing three different concentrations of oxygen-emulating conditions typically encountered during actual bottling. The wines were then exposed to three closure conditions with varying "OTRs" or oxygen transmission rates.

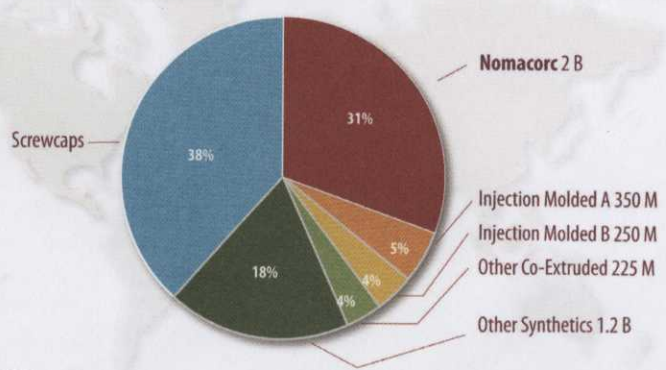
To accurately monitor oxygen pickup and evolution, Nomacorc and Geisenheim used **PreSens Fibox** analyzers, which allow noninvasive measurement of total package oxygen concentration during the bottling process and other winemaking stages (Nomacorc is also marketing the oxygen measurement equipment developed by PreSens for use in the wine industry, which allows for noninvasive measurement of total package oxygen concentration during the bottling).

Total package oxygen is the term used to define the sum of oxygen present in the headspace, dissolved in the wine and introduced through the closure.

Larger wineries typically pay close attention to dissolved oxygen and total

Alternative Closure Market

50% share of synthetic category ~ 31% share of alternative closures 12% share of total wine market



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Nomacorc Research Objectives

- Develop a research platform that will increase and disseminate the understanding of the impact of oxygen on wine development and the role of the closure
- Develop knowledge and capabilities for optimizing the control of oxygen through the wine making process
- Gain insights into closure performance with the ultimate objective of integrating closure design into winemaking

All resulting in:

Improved wine quality and greater consumer enjoyment due to reduced incidence of wine faults, greater wine consistency and optimal bottle aging as the wine maker intended

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package oxygen, look at fill and ullage, and even do checks on the closures be they natural corks, synthetic closures or screw caps. On the other hand, many wineries don't measure much of anything. The industry has focused mostly on monitoring dissolved oxygen levels during bottling due to the inability to measure in tandem the headspace oxygen content. It has been assumed that because headspace volume is rather small, its oxygen content would be insignificant compared to dissolved oxygen. The Geisenheim research, however, demonstrated that the headspace represents a significant reservoir of oxygen that contributes to wine evolution.

Under multiple conditions, the levels of oxygen measured during bottling ranged from a low of .5 mg oxygen per bottle to a high of 6.0 mg oxygen per bottle—a dramatic variance that can impact a wine's shelf life by several months.

Speaking at the seminars in Napa Valley, **Edina Kiss**, Nomacorc's sales manager for Central and Eastern Europe, described preliminary findings from Geisenheim, who said winemakers measuring only dissolved oxygen underestimates the risk of oxidation in their wines.

Also speaking was Dr. **Stéphane Vidal**, global director of enology for Nomacorc, sharing preliminary results from France. His take-home message was that oxygen transfer rates through the closure influence wine evolution in major ways and can be managed for its role in color and aroma development—if and only if bottling conditions are well managed.

Vidal believes winemakers can extend the shelf life of a wine and improve consistency by optimizing certain processes on the bottling line and diligently monitoring and controlling headspace as well as dissolved oxygen levels. He said that once bottling condi-



Sensory Description of the Wines

Irrespective of the starting wine:

Moderate and Low OTR wines are perceived with

higher "animal" notes
higher "burnt" notes
higher "vegetal" notes
less "red fruit" notes
more bitter and astringent mouthfeel

**Wines a little bit reduced
that have not reached
their optimum yet**

Medium and High OTR wines are perceived with

higher "red fruit" notes
higher "caramel" notes
higher "amylic" notes
more intense red color

**Fruity Wines
Nice red colored
Ready to drink**

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tions are under control and oxygen ingress is minimized, winemakers could then select a closure with an optimum OTR to drive wine evolution. Nommacorc just so happens to produce closures that provide variable OTRs, or levels of oxygen permeability.

The ultimate objective of the research, said Nomacorc, is to provide insights into closure performance with the ultimate objective of integrating closure design into winemaking.

Videl presented data indicating that, in some instances, the choice of closure's effect on the sensory attributes of a wine as a result of oxygen ingress is more significant than the effect of oxygen on a wine through micro-oxygenation.

"One of the more revelatory parts of the research was the fact that the closure has more of an effect than the micro-ox, which is quite interesting," noted **John Killibrew**, winemaker for **Havens Wine Cellars**, who attended the briefing.

"There's been this feeling among some winemakers that winemaking somehow ends pre-bottling and that you could walk away somehow," **Jack Thorngate**, an applications chemist with **Constellation U.S.**, who also attended said. "Skilled winemakers wouldn't treat it that way. The fact that everything you've done so carefully can go so wrong in the packaging process is truly remarkable."

"It's a fascinating topic for me, this whole idea of closures and how unappreciated it is in terms of the effect it has on style of the wine," said **Tom Selfridge**, most recently president of **The Hess Collection**, another winemaker who attended. "You do everything up to that point and most winemakers don't pay close enough attention to how they bottle the wine and what they close it with."

— *Cyril Penn*