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Study Finds Bottle Closures Shape White Wine’s Perceived Minerality

Researchers found that low-oxygen closures preserved mineral character; more permeable seals amplified aromas associated with bottle age

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The type of bottle closure used for white wine can affect how strongly drinkers perceive its mineral character after storage, according to a sensory study published in OENO One and reported by Falstaff on Tuesday, November 10. The study found that wines sealed with closures that let in less oxygen were more often linked to higher perceived

minerality and to reductive notes, while wines under more oxygen-permeable closures showed a stronger contrast with aromas associated with aging.

The researchers examined six pairs of white wines from different vintages. In each pair, the same wine was stored in bottle with two different closure types that varied in oxygen permeability. The goal was to test whether the amount of oxygen entering through the closure could influence how tasters judged minerality, a term widely used in wine but often difficult to define with precision.

According to the report, the oxygen already present in a wine can alter the composition of sulfur compounds. By using closures with different oxygen transmission levels, producers can therefore influence how those compounds evolve over time and, in turn, how the wine is perceived. To evaluate that effect, the study combined minerality scores from experts with descriptive sensory work by a trained tasting panel. It also quantified volatile sulfur compounds and basic oenological parameters.

The results showed a graded distribution in minerality scores across the samples rather than a simple yes-or-no effect. The descriptive analysis supported a link between perceived minerality and reductive notes. It also found an opposition between minerality and what the report described as an aging bouquet, suggesting that the aromatic development associated with bottle age may weaken the impression of mineral character in some wines.

Samples sealed with closures that had lower oxygen permeability were more closely associated with perceived minerality than those stored with more permeable closures. Based on that pattern, the study suggested that closures with low oxygen transmission can help preserve the mineral profile of a wine for a longer period. The findings do not mean that one closure is best for every white wine, but they point to a measurable relationship between closure choice and sensory outcome.

That has practical implications for the drinks industry, especially for wine producers deciding how to match packaging to a wine’s intended style. For white wines sold on freshness, tension or mineral expression, a lower-permeability closure could help maintain those traits during bottle storage. For other styles, where a broader and more evolved aromatic profile is desired, a different oxygen regime may be more suitable. In

that sense, closure selection is not only a technical packaging decision but also a possible tool for managing aroma development and the pace of a wine’s evolution after bottling.

The study also adds to a long-running discussion in wine science and trade over the meaning of minerality. Because the term is widely used in tasting notes, marketing and professional evaluation, any evidence that ties the perception to specific storage conditions and sulfur-related aroma patterns is likely to draw attention from producers, buyers and educators. The report from Falstaff presents the findings as further evidence that closure permeability can shape how white wine is experienced in the glass, even when the wine itself is otherwise unchanged.