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Gas transfer through wine closures: A critical review

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ABSTRACT

Background

Gas transfer, and especially oxygen, through wine closures has been studied since the 90s. It started with the problem of premature oxidation in wine. To that purpose, different techniques, issued from food packaging and wine analysis, have been developed to measure gas permeation through wine stoppers.

Scope and Approach

The objectives of this review is first to briefly remind the basic knowledge of gas transfer through materials and applied to wine stoppers. Then, after a short survey about the techniques of measurement, a compilation of all currently available permeation data has been done using the international system of units (when conversion was possible). This finally allowed to establish a critical appraisal between the different methods and closures.

Key Findings and Conclusions

Although relying on different principles, with different accuracy (and respective pros and cons), all methods are well suited to investigate gas transfer through closures. The manometric method appears as the most versatile one, allowing to study all gases with various sample geometry. Whatever the method used, it appears that the technical stoppers are the lowest permeable ones to gas transfer, followed by screwcaps, natural corks and synthetic stoppers. Finally, it is worthy to note that the diffusion coefficient, as an intrinsic parameter, is the most relevant parameter to characterize the gas barrier properties of wine stoppers.

Key words: Packaging, oxygen permeation, cork, diffusion, shelf-life