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How Ceramic Containers Shape Affects Wine Chemistry pH Dynamics

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ABSTRACT

Ceramic vessels used in winemaking can significantly interact with the wine itself. This interaction is driven by the wine's acidity affecting the ceramic material. This process leads to: (1) the release of various elements from the ceramic into the wine; and (2) a potential change in the wine's pH. These interactions are crucial for winemakers to monitor, as they can influence the wine's final taste and stability. Understanding the precise mechanisms at play allows for greater control over the aging process. By carefully managing ceramic exposure, winemakers can enhance desired characteristics and mitigate undesirable ones. Ultimately, this knowledge contributes to crafting higher-quality wines with distinct profiles. The degree of these effects is influenced by the specific ceramic composition and the hydraulic ratio (ρ), defined as the wine's volume relative to the ceramic surface area in contact. Building upon the Avrami law, which models material dissolution kinetics, we introduce an approach to model the evolution of wine pH over time as a function of the ρ ratio. This analysis offers valuable insights into understanding and potentially predicting the dynamic pH changes within wine as it interacts with ceramic vessels. This research holds relevance for optimizing the use of ceramic materials in various winemaking contexts.

Keywords: amphorae, ceramic, dissolution, wine pH

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