

Assessment of Mineral Elements in Wine Spirits Aged with Chestnut Wood

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Introduction

The mineral composition of wine spirit (WS) is of relevant interest due to its potential effect on physicochemical stability, sensory characteristics, and safety [1]. Calcium (Ca) and iron (Fe) can form insoluble compounds, negatively affecting the WS clarity. Transition metals, e.g. Fe and copper (Cu), seem to play an important catalytic role in oxidation reactions. Other elements, such as Cu, zinc (Zn), cadmium (Cd) and lead (Pb), are of concern due to their toxicological properties. The traditional ageing of WS performed in wooden barrels is a time-consuming and costly technology, among other drawbacks [2,3]. For these reasons, alternative ageing technologies, namely the application of wood fragments often combined with micro-oxygenation (MOX) [4], are being examined.

Materials and Methods

Research Methodology: A wine distillate was aged in 250 L wooden barrels (CB, traditional ageing) and in 50 L glass demijohns using wood staves and MOX (alternative ageing system), with two independent replicates, during 365 days (Fig. 1). The alternative system comprised three MOX modalities (CO15, CO30, and CO60) and one control modality with nitrogen (CN). The WSs were sampled at 21, 60, 180, 270 and 365 days of ageing for mineral analysis.

Mineral Analysis: Ca, Zn, Cd and Pb were assessed by adapting an Q-ICP-MS semi-quantitative method previously developed and validated [5]. Fe and Cu contents were evaluated by FAAS [6].

Statistical Analysis: One-way ANOVA was performed to examine the effect of the ageing modality (CB, CO15, CO30, CO60, CN), as a fixed factor, on metals contents of aged WSs in each sampling time. A second one-way ANOVA was carried out to assess the effect of ageing time on WSs metal concentrations.

Objective

To examine the effect of WS ageing with chestnut wood, considering traditional and alternative ageing technologies, on the beverage mineral composition.

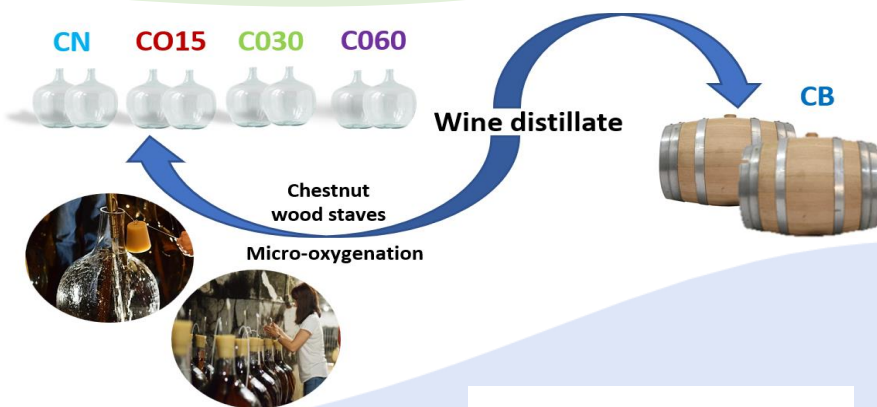


Figure 1: Schematic representation of the ageing essay.

Results

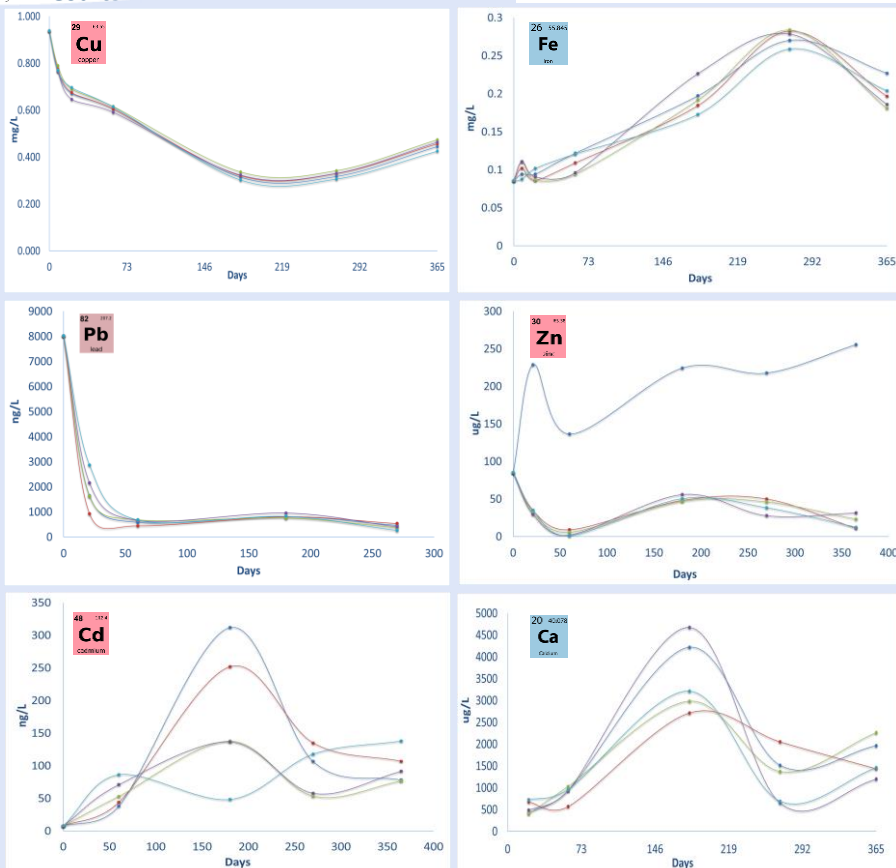


Figure 2: Contents of calcium, cadmium, zinc, lead, iron and copper in the aged WSs according to the ageing modalities and the ageing time.

Conclusions

- At the end of the ageing essay, and for most of the elements, no significant differences between WS from different ageing modalities were found.
- Ageing time had a significant effect on most of them, with different trends and distinct magnitude of changes being observed, depending on the element.
- The concentrations of the mineral elements identified in the WS were generally relatively low, which is positive for the WS quality.

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