

Quantification of coumarins in wine spirit aged by different technologies using chestnut wood

Introduction

Ageing technologies have been studied, namely the application of wood fragments combined with micro-oxygenation (MOx) in a attempt to simulate the physical and chemical changes occurring in a wooden barrel; the results attained by this alternative technology showed that it is possible to accelerate the ageing process in comparison with traditional process, enabling to obtain high quality aged wine spirits (WSs).^{1,2} Phenolic composition in aged WSs has been identified and quantified by HPLC, being the phenolic acids and phenolic aldehydes the most abundant compounds, while coumarins are minority.^{1,3,4} Coumarins are secondary metabolites produced by plants, as a defense against pathogenic attack, being extracted from wood to WSs during ageing. Even if their sensory role remains unclear, their presence in the aged WSs have been associated with increase of bitterness perception.⁵

Material and Methods

Research Methodology: A wine distillate produced by Adega Cooperativa da Lourinhã (Lourinhã, Portugal), was aged for 12 months in 50 L demijohns with Portuguese chestnut wood (*Castanea Sativa Mill.*) staves, comprising different MOx modalities (O15, O30 and O60), one modality with nitrogen application (N, control), and the traditional technology using wooden barrels (T), in replicates.

The WSs were sampled and evaluated in terms of umbelliferone (Umb) and scopoletin (Scop) contents.

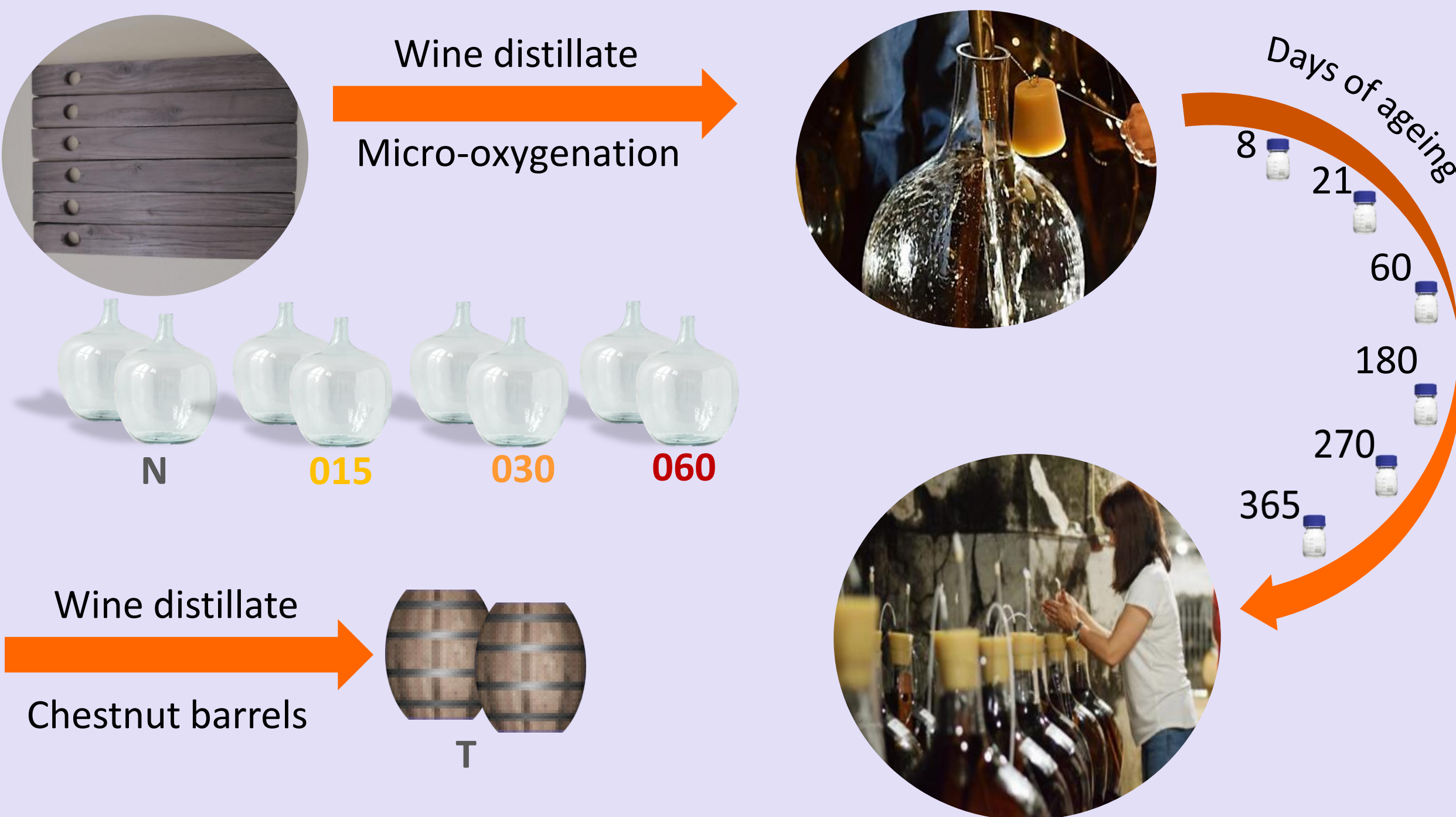
Coumarins Analysis: Umb and Scop contents were quantified by HPLC.⁶



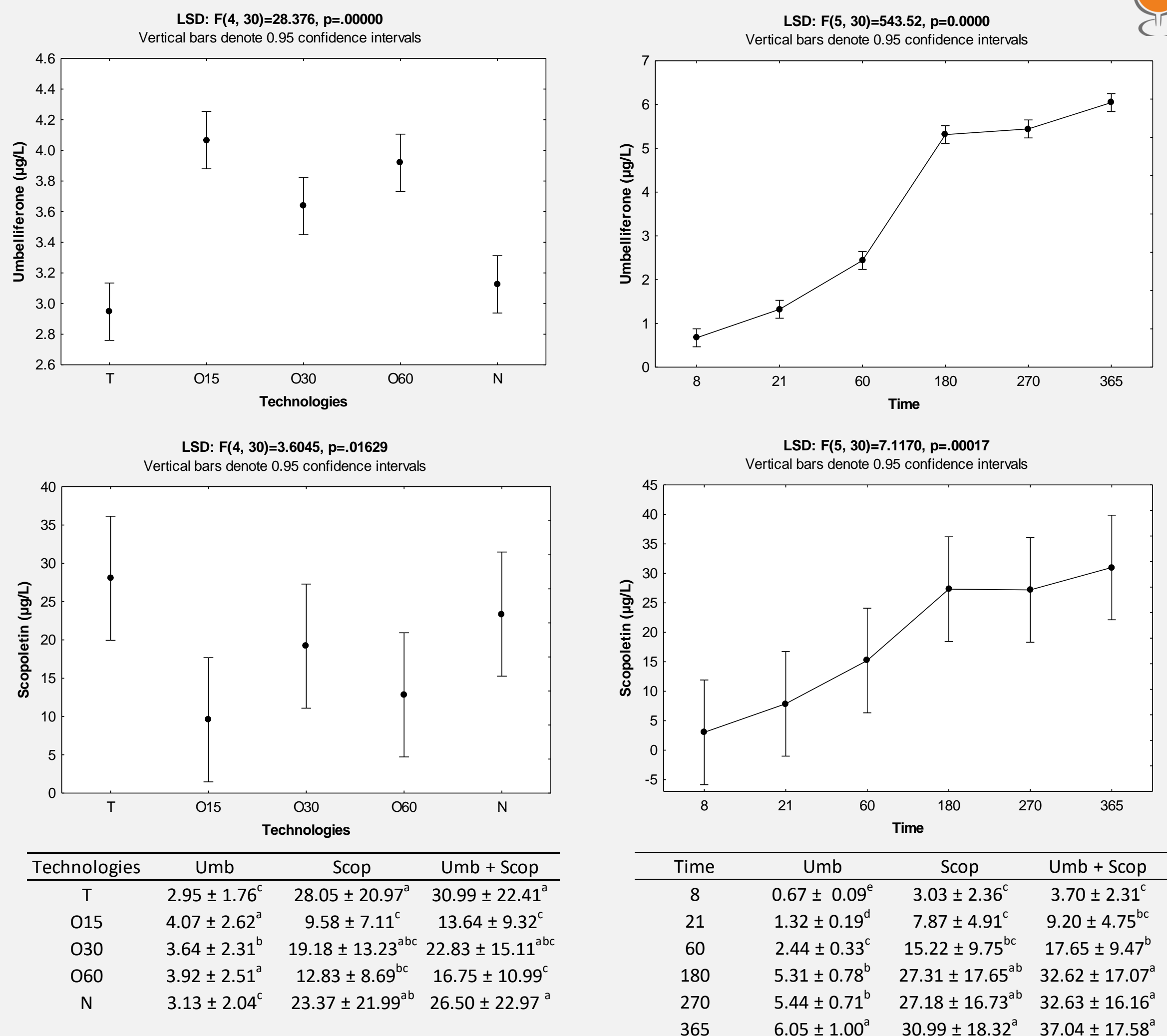
Statistical Analysis: Two-way ANOVA was performed to examine the effect of the MOx level (O15, O30, O60, N) and traditional technology (T), on Umb and Scop contents of aged WSs in each ageing time (8, 21, 60, 180, 270 and 365 days).

Objectives

Quantify both umbelliferone and scopoletin in WSs aged with chestnut wood using different ageing technologies (MOx combined with wood staves vs wooden barrels).



Results and Discussion



Results expressed as mean ± standard deviation. For each compound: ageing time (days) and MOx modalities - means within the same column followed by different lowercase letters (a, b, c, d, e) are significantly different (p<0.05) by Fisher's least significant difference (LSD).

- Ageing time had a significant influence on Umb and Scop contents in the aged WS.
- Umb content increased gradual and significantly from 8 to 365 days; a non-significant difference was only found between 180 and 270 days.
- Scop content also increased over time but in a less significant way.
- WSs from MOx modalities had significantly higher content of Umb (O15, O30 and O60) than those aged in wooden barrels (T) and the control (N).
- Scop content was significantly higher in T and N than in O15, O60 and O30.
- The higher level of oxygen applied (O60) seems to have favoured the balance between additive phenomena and subtractive phenomena involving Umb, but in the case of Scop, it may have contributed to the displacement of this balance to the subtractive ones.



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