



The Dynamics of Exhaustion of Reusable Oak Barrels

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Abstract

In this article has been presented the results of studies on the degree of reducing the concentration of aromatic and phenolic compounds in the oak barrel for use in exposure cycles of wines and cognacs. The concentration of the components in the layer of oak wood which is in contact with the wine or cognac alcohol is significantly reduced with each subsequent cycles of exposures; There are defined the optimal period of use of oak barrels in the conditions of Azerbaijan.

Keywords: Oak barrel, oak's components, excerpts cycles, extraction, depletion, expiry date

Introduction

Quality of cognac alcohols aged in barrels or in a large tanks from oak clapboards, differ and depend largely on the age of the clapboards, its natural drying-maturation and botanical species of used oaks, from time and amount of (cycles) use of oak woods (barrels or staves) [1, 2, 3, 4, 5, 6, 7, 8].

By the first pouring of cognac to new barrels (by the first cycle) is an intensive extraction of oak components that give to alcohols few rough tannic flavors. To ensure the balances (harmony) of organoleptic characteristics of cognacs they will blend with other alcohols or will send for further aging to the other, already used oak barrels.

After the second, third and from each subsequent pouring cycles of alcohol to extraction, the concentration of the components in the oak barrel extractable in cognac alcohol (distillate) is gradually reduced to a minimum level, which indicates of the depletion of oak woods. From that period and thereafter the barrel is no longer due as a source of oak components of aging of wines and cognacs, and it used as a container for storing of distilled wines without noticeable quality improvement. A similar process of oak wood exhaustion occurs in oak clapboards during using in the aging cognacs in large tanks.

Experimental Procedures

In Azerbaijan has not been explored the process of evolution of oak barrels exhaustions with repeated using it for aging of wine distillations. Our further researches have been designated on the exhaustion of the aromatic components of oak barrels with repeated using it during aging of wine distillations.

In the beginning to characterize the decline of oak barrels in reusing have been studied natural reserve concentrations of aromatic and phenol compounds in the wood staves of oak barrels, which was set at 100% of the natural reserves, and the concentration of these components in the brandy cognac spirits accumulated for each cycle aging in barrel (1 cycle -in 1 year extraction). It is possible to calculate the potential residue (stock) concentrations of the components in wood of oak barrels after each cycle's endurance of alcohols.

Results

The results of research concentrations of the components in wood of oak barrels and in cognac spirits after various cycles of exposure have been restated as a percentage of their natural resources in new wood barrels. To avoid biases, in experiments are used a young cognac alcohol out of connatural part of Rikachiteli grape species.

Discussions of Results

According to the researches (in Fig1 - Fig5) found that the concentration of phenol compounds and aromatic oak wood in the boundary layers the inner surface of the barrels in contact with cognac alcohol significantly decreased with each successive cycles of exposures and reaches the minimum in 7 ... 8 cycles (within in an annual filling). Thus, while in the first and second fill extraction components of oak woods in cognac spirits were high and are amounted to respectively in 29...50,9 and 17,4...23.1% concentrations of the components of the natural reserve of oak woods. There are faster extracted phenol substances - tannins, then vanilla, scopoletin, and later (in the second filling) - phenol substances and whiskey lactones. From them in the first cycle these data are confirmed the tendency of light extractions and hence a high concentration of phenol compounds in cognac alcohols by the first pouring.

In the third and fourth pouring from the Oakwood, in general, there has been extracted the lower concentrations of natural reserves components of oak wood accordingly to 14.5 ... 20.7 and 5.8% ... 10.1%. However these cognac alcohols are characterized with the best aroma indicators with mild tastes instead of alcohols obtained after the first and second pouring. It has caused by a lower extraction of phenol substances in the cognac alcohol, but the concentration of aromatic components has been reached a high level by a Eugenol and whiskey lactones.

Conclusions

In average, less than 10% of concentration of the components of natural resources extracted to the oak cognac alcohol from wood barrels in the fifth and subsequent filling. Therefore, even at the sixth and seventh fillings the barrel can be considered depleted by more than in 90%.

These data have been confirmed by the practical experiences of manufacturers seasoning of cognac alcohol and wines in barrels in many countries consist of in 3...4 cycles in 90% to depletion of oak barrels according to optimal using oak barrels until of expiry date of using, that is led out by extraction of wine during 6-12 years of aging and 16-18 years of cognac alcohols aging [9, 10, 11, 12].

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Annexure

Figures:

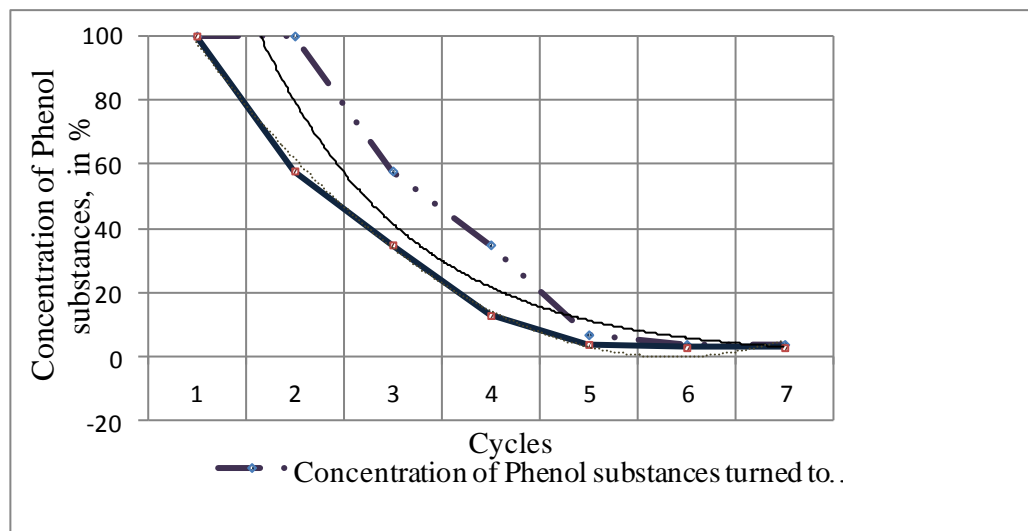


Figure 1

The concentration of phenol substances in barrel's wood and in cognac alcohol after different extractions cycles

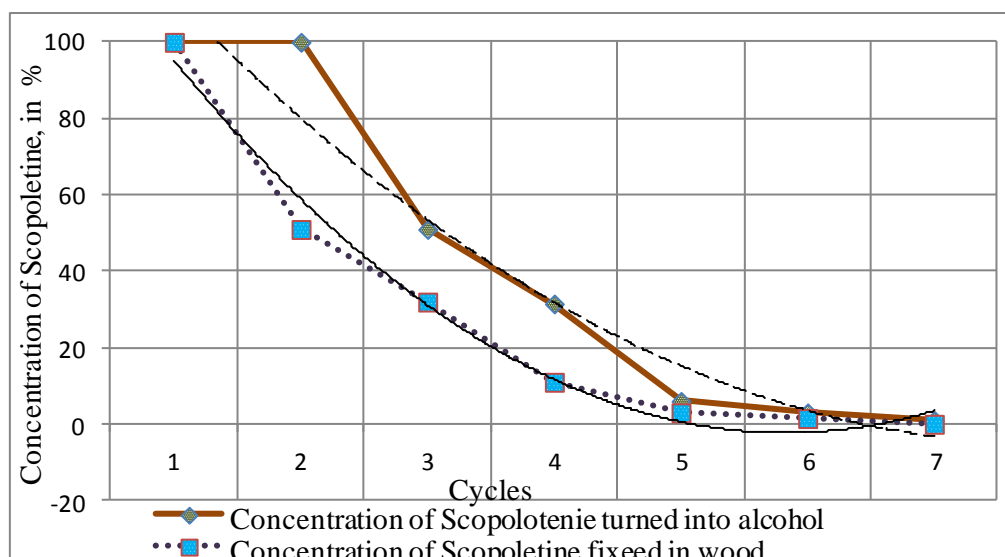


Figure 2

The concentration of Scopoletine in barrel's wood and in cognac alcohol after different extract cycles

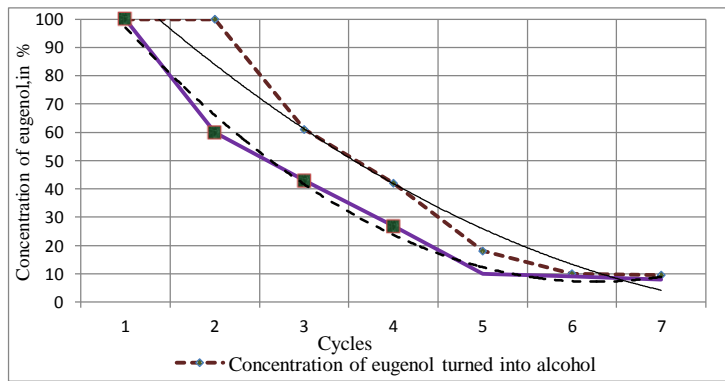


Figure 3
The concentration of the Eugenol barrel's wood and in cognac alcohol after different extraction cycles

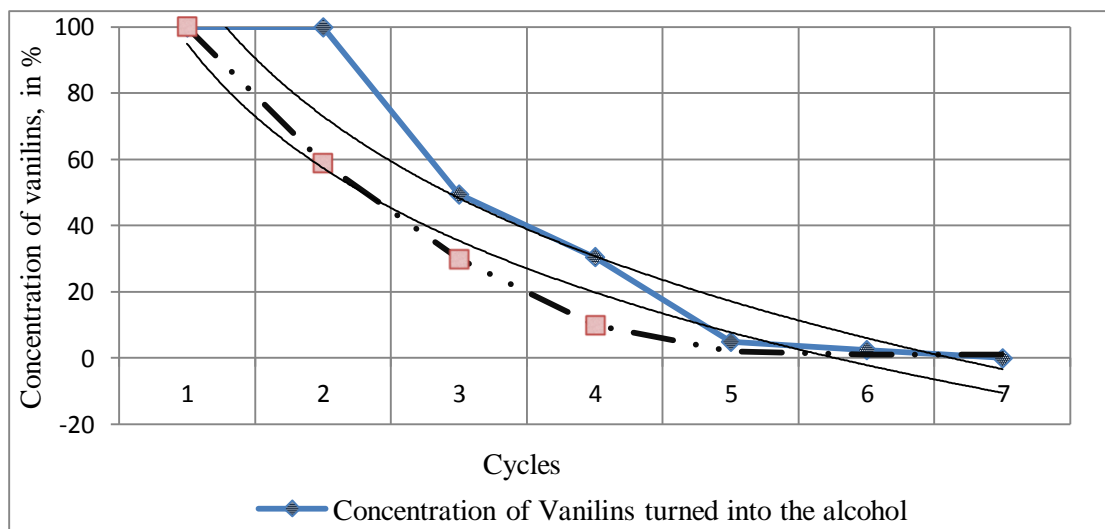


Figure 4
The concentration of the vanilin in barrel's wood and in cognac alcohol after different extraction cycles

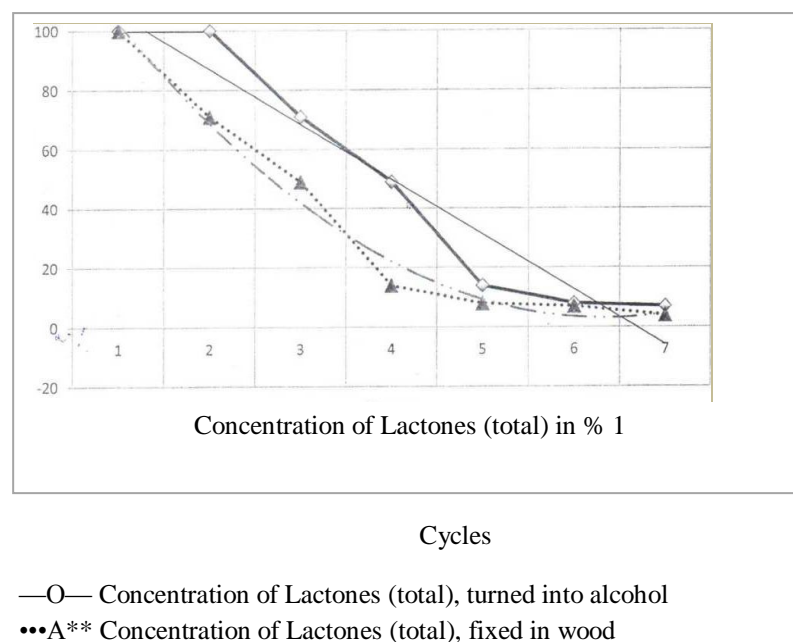


Figure 5
The concentration of aromatic lactones (sum of cis and trans-p-methyl-y-octalactone) in wood barrels and in cognac alcohol after various cycles of excerpts