Ensuring the preservation of the quality of wine during storage

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Annotation. The article presents the necessity for a detailed approach to the choice of packaging for wine, as well as assessing their quality level. It has been established that the transformation of the component composition of wine proceeds with different intensity depending on the type of packaging and leads to different consequences, mainly due to the occurrence of redox reactions, as well as the degree of gas exchange during storage. Complex packaging "package in a box" can become a source of premature oxidation of wines and the appearance of foreign synthetic inclusions in them.

1 Introduction

During the storage, various processes occur in wines, leading to the transformation of the components of the composition. There are a number of factors that can influence this process [1–9]. Since wines do not have an expiration date, they can be stored indefinitely, however, packaging can help reduce this process. [10-14].

As a rule, wines for long-term storage are bottled in glass bottles, but if aging is not foreseen, then options with polyethylene terephthalate bottles, package-in-box packaging, etc. are possible. high brittleness and high mass. In addition, the "package in a box" packaging implies the presence of a multi-layer polymer bag that provides complete protection of the wine from sunlight and oxygen exposure. The package is also equipped with a built-in valve (faucet) for batch dosing of products [15-16], which ensures complete tightness even after opening, which guarantees the best preservation of wine. Also, in addition to ensuring the sterility of the product, such packaging is convenient for transportation, especially over long distances, since the product is transported with a minimum weight of the package.

At the same time, to date, the impact of such alternative packaging on the quality and safety of the product placed in them has not been studied. Accordingly, the study of the transformation of the component composition of wine during storage, depending on the type of packaging, is relevant.

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2 Materials and methods

During the research, the objects were samples of dry and semi-sweet white and red wines, bottled in glass bottles and in complex packages "package in a box" (hereinafter - the package), as well as unused metallized bags-liners metallized with a valve valve (hereinafter - the package), made from a combined material.

3 Results and Discussion

During the studying the degree of preservation of wine in a package, an assessment was made of a batch of products poured into such a package after transportation. As a result, packets with external defects were revealed (Fig. 1): the destruction of the metallized layer in the form of shedding (a, b) and its rupture in the area of seam soldering (c, d).

a *b* *c* *d*

Fig. 1. Defects in the appearance of samples

The results of testing similar unused bags for the tightness of the seams, performed in accordance with the interstate standard GOST 12302-2013 “Bags from polymer films and combined materials. General technical conditions", testified that the leakage of the seams of the liner package and the seam connecting with the valve was not detected, however, a leak was found in the valve-faucet itself.

Assessment of the microbiological state of the packages, which was carried out by microscopy of the centrifuge formed as a result of centrifugation of the aqueous-alcoholic extract of the inner layer of the studied packages, showed the absence of vital

microorganisms in the field of view of the microscope. However, the presence of extraneous amorphous inclusions in the form of conglomerates of various shapes and sizes, presumably of polymeric origin, was revealed (Fig. 2).

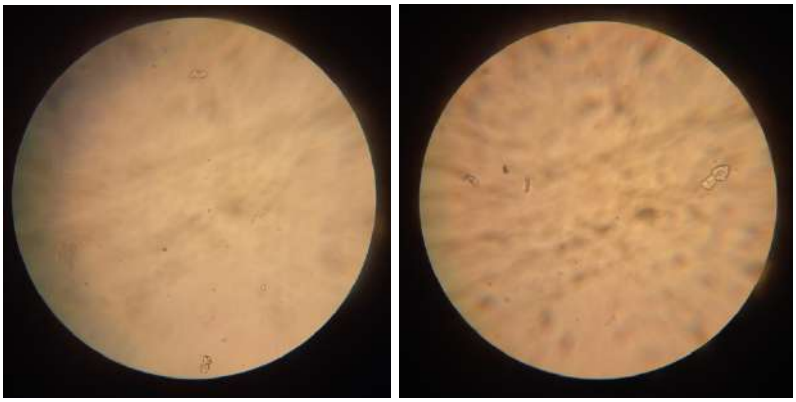

Fig. 2 Microscopic images of the hydroalcoholic extract of the inner layer of the bags

The degustation of the studied samples in different packages showed the presence of a light synthetic tone in the wines bottled in bags; also, in these samples, oxidation tones in aroma and taste were identified. In wines in glass bottles, there were no extraneous tones in the aroma and off-flavours in the taste.

Comparative studies of the amount of dissolved oxygen in wine in various packages (table) made it possible to establish that its variation was insignificant in samples in a glass bottle (from 4.08 mg/dm^3 to 4.32 mg/dm^3).

Table. The content of total sulfur dioxide and dissolved oxygen in experimental samples of wines

Sample characteristic	Type of packaging	Dissolved oxygen content, mg/dm^3	Sulfur dioxide content, mg/dm^3
Dry white wine	Glass bottle	4,16	59
Semi-sweet white wine		4,32	84
Dry red wine		4,21	74
Semi-sweet red wine		4,08	102
Dry white wine	Complex packaging "bag in a box"	3,90	74
Semi-sweet white wine		2,97	69
Dry red wine		5,10	68
Semi-sweet red wine		4,11	79

In experimental variants, poured into bags, a pronounced spread of values was observed - from 2.97 mg / dm^3 to 5.10 mg / dm^3, which can be explained by the unstable level of quality of the liners themselves and, accordingly, by the chaotic oxygen exchange. It is also necessary to add that the stabilization of the level of oxygen content in wines in glass bottles can occur due to gas exchange through the cork that seals the bottle

Correlation between oxygen content and sulfur dioxide in this experiment was not revealed.

4 Conclusion

It has been established that the combined packaging "package in a box" with wine during transportation may have the destruction of the inner and / or outer layers of the package insert, which will lead to damage to the finished product. In addition, as a result of an uncharacteristic process of gas exchange in wine, the component composition is transformed, leading to the appearance of negative organoleptic characteristics. The microbiological state of the bags can also cause foreign synthetic inclusions in the finished wine.

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