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# Oak Extract Receiving and Using For Aging Acceleration of Brandy Alcohol

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**Abstract**: The article "Receiving and using oak extract for accelerated aging of brandy alcohol" investigates the chemical composition of oak wood. Oak wood is known to be rich in phenolic compounds, lignins, the decomposition and oxidation products of which enrich brandy alcohol with biologically active compounds that add to its smoothness and velvetiness. The article examines the chemical compounds in oak barrel trunks. Oak extract was obtained through experimental studies. Technological modes of obtaining oak extract were established:. Quality of oak shredding; Extractors for processing oak wood cells, washing and drying conditions of oak were selected; Oak processing temperature regimes. The blend of 2-year-old brandy alcohol obtained with m's extract was equated to the 3-year-old brand in terms of chemical composition and tasting data.

**Keywords:** Oak, Extract, Technological, Modes, Shredding quality, Delay time.

**The aim of the study.** was to obtain and use oak extract for accelerated aging of young brandy spirits. The production of the brand envisages the aging of brandy spirits in oak barrels. Oak enriches brandy spirits with oak tannin and its decomposition products, the oxidation products of which add cognac to smoothness and velvety. These substances may include substances extracted from oak pulp in saccharide alcohol.

**Literature:** Qualitative and qualitative content of brandy components is determined by the quality indicators of brandy spirits and brand. Delayed brandy alcohol in oak wood produces lignins from the oak, the oxidation and decomposition products of which are the sum of aromatic aldehydes, higher alcohols, and ethers. (Singleton 1995) brandy alcohol is divided into substances that are released during distillation from wine materials and substances that are formed during aging in oak barrels. According to the recent classification, the substances that are released during distillation are called volatile substances, and the substances that are formed during aging in oak barrels are called non-volatile substances. ( Awad P. et.al 2017; Guymon, JF; Crowell, et al, 1968).

Tanines increases during the aging of brandy spirits. Freshly distilled brandy alcohol contains neither dyes nor tannins. During aging, both of them come out of the oak in brandy alcohol (Puech, JL 1988). Tannins obtained from different types of oak differ from each other. Oak is considered to be the most desirable material for the aging of the brand. Different places and species of oak differ from each other in the content of tannins (Puech, JL (1984), Vivas, N. 2002).

According to Russell (Russell 1935) the main natural tannin found in oak is flobatanine. Flobatanines are flobafen-producing tannins, and flobaphenes are red or brown amorphous insoluble substances that are easily formed by heating with mineral acids diluted from flobatanine. The tannins in oak found by Russell were chloroglucin and gallic acid.

Oak tannin is more or less chemically closest to catechins. It often produces protocatechinic acid. Vanillin is the methyl ether of protocatechinic acid. Victoria Moreno Arribas M 2009

tannins are grouped in the hydroxyl group of pyrogallol. The tannins of brandy alcohol are not a homogeneous complex (Kennedy, JA et.al 2006); Skurikhin found in his experiments that tannins in brandy alcohol are not only in the free state but also present in relation to lignin (Skurikhin 2005).

**Research Objects and Methods:** Research Objects Were young one, two and three year old branded spirits obtained from Askaneli Ltd. distillery. As well as oak barrel tkech used in winemaking. In order to obtain the extract from the oak rye, a barrel rye used in wine was selected. In order to determine the best option for making the extract, the following were made from oak chips: 1. Oak chips; 2. Oak sawdust; 3. Oak burbushela; 4. Roasted oak, the particle size of which was 1-3 cm, 3-5 cm and 5-10 cm.

In order to extract the substances needed for the brandy alcohol from the oak, the oak pulp was crushed into particles of different sizes to increase the contact area of the extractant oak. Extracts were extracted from each of the crushed masses with a solution of 0.1 normal sodium alkali and 0.1 normal hydrochloric acid. Different temperature regimes were used for heat treatment of oak: 30-35 $^0$ C, 60-65 $^0$ C, 100-125 $^0$ C, 150-160 $^0$ C.

The following were tested:

1. Freshly distilled brandy alcohol - colorless;
2. Aged brandy alcohol in 1 year old oak - small color;
3. 2-year-old oak brandy alcohol - tinted to a slightly thicker.
4. Aged brandy alcohol in 3-year-old oak - even darker in color;
5. A blend of brandy spirits taken under the name of a 3-year-old aging brand.

Determine the tannins in the oak extract by the Neibauer and Leventhal methods. The cone extract was determined by the gravimetric method; Determine iron by spectrometric method at a wavelength of 600 nm on a spectrophotometer. We identified copper in the study samples Contents using the atomic-absorption method. The following were also identified in the study samples: methanol components: n. Mass concentrations of propanol, isobutanol, isoamyl alcohols, aldehydes and complex ethers (calculated in mg / 100 cm$^3$ of anhydrous alcohol) by gas chromatographic method. Gas chromatography can detect volatile components. Our study samples were subjected to gas chromatographic analysis to determine methanol, higher alcohols, aldehydes, and complex ethers. Numerical data of chromatographic analysis obtained by gas chromatography method of cognac 1, 2 and 3 years old spirits are given in Tables 1, 2, 3.

**Table 1. Results of chromatographic analysis of Brande 1, 2 and 3 years old spirits**

| № | Name of component | Brandy alcohol with 1 year aging | Brandy alcohol with 2 years of aging | Brandy alcohol with 3 years of aging |
|---|---|---|---|---|
| 1 | Methyl alcohol, g / dm3 , $^{a.a.}$ | 0.25 | 0.28 | 0.30 |
| 2 | Acetaldehyde, mg / 100 cm $^3$ a.a. | 11.4 | 14.0 | 17.8 |
| 3 | Ethyl acetate, mg / 100 cm $^3$ A.A. | 61.2 | 70.4 | 90.3 |
| 4 | Butanol 2, mg / 100 cm $^3$ A.A. | 0.3 | 0.52 | 0.64 |
| 5 | N-propyl alcohol, mg / 100 cm $^3$ a.a. | 25.9 | 31.4 | 34.8 |
| 6 | Isobutyl alcohol, mg / 100 cm $^3$ A.A. | 78.4 | 80.1 | 75.9 |
| 7 | N-butyl alcohol, mg / 100 cm $^3$ A.A. | 0.12 | 0.10 | 0.14 |
| 8 | Isoamyl alcohol, mg / 100 cm $^3$ A.A. | 131.4 | 135.4 | 128.4 |

| | | | | |
|---|---|---|---|---|
| 9 | Total amount of higher alcohols, mg / 100 $cm^3$ a.a. | 236.1 | 247.5 | 239.9 |

**Table 2. Chemical composition of one-year aging brand**

| Determination of chemical parameters | Norma | Actual |
|---|---|---|
| Volume share of ethyl alcohol% | 40.0 | 40.0 |
| Sugar mass conc. Switch to invert sugars. G / $dm^3$ , not more than | 20.0 | 14.8 |
| Б. Propanol mg / 100 $cm^3$ calculated on the basis of anhydrous alcohol | - | 5.1 |
| Isobutyl alcohol mg / 100 $cm^3$ calculated on the basis of anhydrous alcohol | - | 22.5 |
| Isoamyl alcohol in mg / 100 $cm^3$ calculated on the basis of anhydrous alcohol | - | 214.7 |
| Mass concentration of higher alcohols. Mg / 100 $cm^3$ in anhydrous alcohol by calculation of isoamyl alcohol | 170.0-500.0 | 242.3 |
| Mass concentration of aldehydes in anhydrous alcohol based on acetic acid aldehyde mg / 100 $cm^3$ | 5.0-50.0 | 12.8 |
| Mass of volatile acids Con. In anhydrous alcohol, calculated on acetic acid mg / 100 $cm^3$ not more than | 200 | 16.4 |
| Methyl Sp. Massive Conc. Transfer to anhydrous alcohol G/$dm^3$ , not more than | 2.0 | 0.06 |
| Copper mass conc. Mg / $dm^3$ , not more than | 8.0 | 0.15 |
| Mass concentration of iron mg / $dm^3$ , not more than | 1.5 | 0.20 |
| Concentrated extract g / $dm^3$ , not less than | 0.5 | 0.86 |

**Chemical composition of industrial blend of 3-year-old aging brand**

| Determination of chemical parameters | Norma | Actual |
|---|---|---|
| Volume share of ethyl alcohol% | 40.0 | 40.0 |
| Sugar mass conc. Switch to invert sugars. G / $dm^3$ , not more than | 20.0 | 14.0 |
| N. Propanol mg / 100 $cm^3$ calculated based on anhydrous alcohol | - | 8.3 |
| Isobutyl alcohol mg / 100 $cm^3$ calculated on the basis of anhydrous alcohol | - | 25.1 |
| Isoamyl alcohol in mg / 100 $cm^3$ calculated on the basis of anhydrous alcohol | - | 202.2 |
| Mass concentration of higher alcohols. Mg / 100 $cm^3$ in anhydrous alcohol by calculation of isoamyl alcohol | 170.0-500.0 | 235.6 |
| Mass concentration of aldehydes in anhydrous alcohol based on acetic acid aldehyde mg / 100 $cm^3$ | 5.0-50.0 | 14.2 |
| Mass of volatile acids Con. In anhydrous alcohol, calculated on acetic acid mg / 100 $cm^3$ , not more than | 200 | 18.8 |
| Methyl alcohol mass conc. Transfer to anhydrous alcohol. G / dm3 , not more than | 2.0 | 0.074 |
| Copper mass conc. Mg / $dm^3$ , not more than | 8.0 | 0.21 |
| Mass concentration of iron mg / $dm^3$ , not more than | 1.5 | 0.25 |
| Concentrated extract g / $dm^3$ , not less than | 0.5 | 0.81 |

**Judgment of the obtained results:** The oak twigs taken for the experiment were broken into pieces of different sizes: 1-3 cm, 3-5 cm and 5-10 cm in size. Each mass was washed separately with cold, hot and again cold water, spread on filter paper and dried at room temperature. The dried samples were treated with 0.1 normal sodium alkali with a 2-day

delay and frequent vortexing. Was treated similarly using 0.1 normal hydrochloric acid. After a delay of two days, the crushed oak was washed well first with cold, then hot, and then again with cold water. Samples were dried and heat treated using various thermostats at 30-35 $^0$ C, 60-65 $^0$ C, 100-125 $^0$ C, 150-160 $^0$ C. As a result of heat treatment experiment was selected at 150 $^0$ C. The oak processed at this temperature had a pleasant aroma, reminiscent of vanilla, chocolate and coffee. From the obtained temperatures according to the pleasant aroma was selected 150 $^0$ C. The time of delay at temperature was 3 days. Heat-treated oak samples were extracted using ethyl alcohol. In advance they were added hydrogen peroxide to accelerate the oxidation of oak extractives. 3-5 ml per 1 liter of alcohol. The extraction was carried out for three days. After cooling the sample, the alcohol extract and the syrup were separated separately. The extract was organoleptically tested and chemically analyzed. From the extracts obtained from the organoleptic data, oak particles with a length of 1-3 cm were selected according to the organoleptic data. Subsequent experiments were continued on 1-3 cm oak sawdust. The amount of tannin in the oak extract was determined, we got 3.06 g / liter.

The best oak extract selected by experiment was placed in different quantities of freshly distilled colorless brandy alcohol with an alcohol content of 69.8 mL. % And in a separate rectified alcohol, the alcohol content of which was reduced to 69.8 mL%.

The object of research was 2-year-old brandy alcohol. A 2-year-old brandy blend made with the above-mentioned alcohol, to which was added the oak extract obtained by us in various quantities, and compared with the 3-year-old aging blend obtained by the organoleptic plant. The obtained sample was chemically analyzed to determine: ethyl alcohol, mass concentration of copper and iron and condensed extract g / dm 3 (see Figs. 1,2,3).

As Tables 1, 2 and 3 show, the chemical and tasting data of brandy spirits coincide with the literary data and comply with the norms established by the legislation of Georgia. As for the extract obtained by the addition of the extract, the chemical composition is close to the chemical composition of the production 3-year-old brand.

**Conclusion**

1. Experimental studies obtained oak extract and established technological modes of its reception:

A. Quality of oak shredding; B. Oak washing and drying conditions were selected; C. Extractors for processing oak wood cells were selected; D. Temperature and delay modes of oak processing were selected;

The method of obtaining the extracted from the treated oak was established.

2. The method of obtaining the extracted oak extract, which is characterized by a pleasant soft taste and aroma, was established.
3. The blend of the 2-year-old brandy alcohol obtained from oak extract was equivalent to the 3-year-old brand of production. Their chemical and organoleptic data did not differ much from each other.

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