

STUDIES REGARDING THE QUALITY OF THE ALCOHOL OBTAINED IN THE INDUSTRIAL SYSTEM COMPARED TO THAT OBTAINED IN THE TRADITIONAL SYSTEM

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Abstract

The industry of alcohol was, is and will be important for our country, first of all, for the branches of the industry that use the alcohol and for obtaining of different food and non food products. The obtaining of bio alcohol (palinca) in our country represents a tradition in the rural area. This is obtained of fruits (plums, apples, pairs, peaches, apricots) and of cereals with amyllum, especially the corn, the latter in percentage of 90% in the alcohol factories. From the study accomplished was observed that the bio alcohol obtained in the traditional system (palinca) contains a very large quantity of aldehydes that is over the limit admitted and that represents a real danger, because by a long consumption it can affect the health of the consumers. Also from the bio alcohol (palinca) was determined quantities significantly larger of other composites compared to the ethylic alcohol.

Key words: ethylic alcohol, bio alcohol, industrial process, bio process

INTRODUCTION

The origin of the word “alcohol” is not clearly established, being considered to come from the Arab language, due to the prefix al. This term was introduced in Europe, in the 12th century, by European, who translated the discoveries of the Islamic alchemists.

The industry of alcohol is based mainly on the fermentation activity of the yeasts, that transform the fermenting glucides from the substrate in ethylic alcohol as main product of fermentation and respectively in biomass.

The alcoholic fermentation uses natural substrates rich in fermenting glucides, and the speed of fermentation and transformation of glucides in main and secondary products is dependent of many factors of which also biologic factors. Even since 1855-1877 was established by the Buchner brothers, that the alcoholic fermentation is caused by the enzymes elaborated from the yeast cell demonstrating the enzymatic nature of the fermentation. The cellular enzymatic complex is formed of 15 enzymes that catalyze, in different stages, the processes of oxide reduction of the fermenting glucides and finally the forming of the ethylic alcohol.

The ethylic alcohol obtained on the bio technological way bears also the name of bio alcohol, thus being distinguished the synthesis ethylic alcohol (Donca Gh., 2013).

The degradation of the carbon hydrates and their transforming in ethylic alcohol presupposes a mechanism including successive enzymatic reaction, reaction that take place in the presence and with the help of adenosine and thiamine of the phosphates and coenzyme A, and of some hydro soluble vitamins as B₁, B₂, B₅, B₆, PP, etc. (Popovici R., 2008).

In the traditional system bio alcohol can be obtained of fruits as: plums, apples, pears, cherries, peaches, apricots, quinces and also from the fermenting of the cereals. This is dependent on the geographical area where it was produced and it receives different names but the most common used and known also on the international level is palinca. Due to the content of glucides, the plums represent the fruits most often used, and which in the same time give the real natural plum brandy (Bei M. F., 2012).

The quantity of glucides varies depending of the plum species, so that, there are many breeds with different percentages of glucides: from 7,25 to 15,95% (Popovici M., 2012). The most common breeds of plums planted in order to obtain the palinca are: fat tuleu, in average of 12,54% glucides, Anna Spath – 12,71% glucides, of Bistrița 11,6% glucides, but the national breed used is Romania fat.

The alcohol presents many utilizations: in the food industry is used for the production of alcoholic beverages and of vinegar, in the chemical industry for obtaining of synthetic rubber and as dissolvent, in the pharmaceutical industry for the preparing of substances (ether, chloroform), in the medicine as disinfectant and as isopropyl alcohol used for the petroleum distillation (Banu C., 1974, Banu C., 2000, Banu C., 2009).

MATERIAL AND METHODS

For the performing of this study we needed ethylic alcohol, palinca that in this case was obtained of plums, meter alcohol and cromatograph. The determining of the content in alcohol of the samples was accomplished with alcohol meter that had incorporated also a thermometer, that was introduced in a graded cylinder full of alcohol and was determined thus the volume and the chemical compounds by the chromatography method.

RESULT AND DISCUSSION

According to the analysis accomplished regarding the volume in case of bio alcohol obtained in the traditional system, of the results obtained (table 1) we can observe that at the temperature 22,5°C was obtained 49.5% vol of alcohol and at 20°C was of 52 % vol alcohol, being determined thus that depending on the temperature of storage the volume in alcohol increases and decreases. In practice, the volume of alcohol of the bio

alcohol is measured at 20°C, with each degree over this temperature of storage, the alcohol hardness decreases.

Table 1

Determining the volume of alcohol depending on the temperature of storage of the bio alcohol

Temperature °C	Vol. alcohol %
22.5	49.5
20	52
21	51.5

In case of obtaining the bio alcohol by traditional methods the producers don't use any instrument to verify the quality of the obtained products, the only way is the sensorial one. Also the smell gives the flavor of the obtained product, the specific flavor of the fruit of which it comes, in our case of plums because the bio alcohol was obtained of plums and other flavors, in case of distillates obtained of other fruits/cereals.

The conditions in which is obtained the bio alcohol, can influence the taste and the quality of the final product. The negative modification in taste can appear during the production flux, when due to the lack of attention, the marc can be burned, giving thus the bio alcohol a burnt taste.

Also were accomplished also other tests for the two types of distillates by the chromatography method, in order to identify the level of chemical compounds in the two types of distillates. The analysis was accomplished using 10 l of alcohol, with the dilution factor of 1.

Thus in case of the analysis of the ethylic alcohol obtained of cereals, were registered values that are found in the table 2 of which it can be observed the fact that it presents a content of 1,4 mg/l of acetaldehydes and approximately 1,4 mg/l of methanol.

Table 1

The chromatography determination of the chemical compounds of the ethylic alcohol obtained in industrial system

Duration (minutes)	Chemical compound	Content mg/l
2,457	Acetaldehyde	1,4
2,600	Ethyl acetate	0,0
2,811	Methanol	1,4
14,350	Superior alcohol	0,0

In the analysis report of bio alcohol (table 3), it can be observed the presence of a higher level of acetaldehydes of approximately 33 mg/l, the great presence of ethyl acetate (which in case of the analysis of ethylic

alcohol is zero) of 758,6 mg/l. Also this presents a high level of methanol and superior alcohols (3394 mg/l, respectively 2046,1 mg/l).

It can be observed also the great difference in what represents the time in which was concluded the process of synthetizing of the chemical compounds. For example in the analysis report of the Ethyl acetate from the bio alcohol, the duration of the analysis is of 7,643 minutes, compared to 2,811 for the analysis of the ethylic alcohol obtained in the industrial system. The same can be observed in the case of the other analyzed chemical compounds.

Table 2

The chromatographical determination of the chemical compounds from bio alcohol

Duration (minutes)	Chemical compound	Content mg/l
3,462	Acetaldehyde	33,0
7,643	Ethyl acetate	758,6
7,865	Methanol	3394,2
17.300	Superior alcohol	2046,1

According to an analysis accomplished (table 4), the content of the volume of alcohol in the ethylic alcohol is of 96,60% and the volume of the alcohol obtained in the traditional system respectively of the bio alcohol is of 50,70%.

Table 3

The results of the laboratory analysis regarding the content of alcohol and aldehydes

Product	Alcohol	Aldehydes	
	% v/v	mg/l product	g/hl pure alcohol
Ethylic alcohol	96.60%	1.170	0.113
Bio alcohol	50.70%	0.6	3.9

We should mention the fact that the bio alcohol obtained of substantial volatile fruits is assimilated with the sum of the superior alcohols, aldehydes and esters.

Table 5

The comparative analysis of the alcohol obtained on the industrial/traditional way

Product	Esters		Methanol		Superior alcohols		Volatile substances
	mg/l product	g/hl pure alcohol	mg/l product	g/hl pure alcohol	mg/l product	g/hl pure alcohol	g/hl pure alcohol
Ethylic alcohol	0.124	0.012	1.346	0.130	1.925	0.186	-
Bio alcohol	000.4	97.3	083.7	05.5	077.4	09.7	621.0

From the point of view of the consumer security, the bio alcohol has a greater quantity of aldehydes mg/liter of product with 70,6 mg/l (that in excess is carcinogenic) towards the level of aldehydes from the ethylic alcohol that registered 1,170 mg/l.

Also, the quantity of esters and methanol on mg/l products is the highest in case of the bio alcohol compared to the content of esters and methanol from the ethylic alcohol of 0,124 and respectively of 1,346 mg/l. It can also be observed in the table also the high level of superior alcohols and volatile substances in the finished products obtained of fruits.

CONCLUSIONS

This study proves the fact that, from the point of view of the consumer safety, the alcohol, and especially that obtained by alcoholic fermentation (due to the level of volume of alcohol) has unfavorable effects on the human body by the absence of some vitamins from the B complex, Vitamin A, hydro electrical (mineral) unbalances, and it can exist consequences manifested in the activity of the centers responsible of the balance, perception, speech and thought, provoking an intoxication of the body in time slowing down the functioning of the cells and organs. The effects of the excess of alcohol can lead to an emotional unbalance, cancer, diseases of the liver, heart attacks, pulmonary edemas, up to alcoholic coma and even death when it is consumed in excess.

The presence of the large quantities of chemical compounds as the acetaldehydes in the alcohol show the quality of the fruits distillation. The absence of the modern technological equipment, respectively of the instruments of measurement and control of each technological stage, determines the obtaining of a product that presents many risks for the consumer.

By the utilization of the traditional methods are not taken measures of reduction of the risks of production and thus, the probability of obtaining some weak results increases comparatively, with the industrial system where by the norms of hygiene applied and the quality standard used are reduced the risks of obtaining a product of low quality, respectively is assured the safety and security of the consumer.

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