STUDY REGARDING THE QUALITY AROMATIZED WATERS

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ABSTRACT: The aim of this paper is to test the composition balance of waters with added functional ingredients: aromatized waters – the most recent concept of soft drinks on the world market. Foodstuff quality control justifies the food preservatives used in soft drinks industry and it establishes their optimum concentration for various storage conditions.

Keywords: aromatized waters, functional ingredients, preservatives, microbiology

JEL Codes : Q50, Q57

Introduction

A functional drink can be defined as the drink that does more for the consumer than hydrating them and maintaining their bodily fluids at an acceptable level. The additional benefits are the vitamins, mineral salts or plant extracts acting as antioxidants, which are connected to a healthy life despite the stress of our modern lifestyles [1].

Aromatized waters are a blend of fruit juices, aromatized substances (natural or synthetic), added to drinking or table mineral water, sweeteners (sugar, glucose, sucrose, aspartame etc.), food acids (the benzoic and citric acids), and vitamins with or without added carbon dioxide.

In the study of aromatized water quality, we can begin with their primary compounds: the wrapping and content. However, the quality of ingredients (the raw matter) and their dosage are essential premises in view of obtaining a perfect drink.

Thus, sweeteners are among the ingredients used in aromatized water production: glucose, fructose or fruit sweeteners, insuring other advantages besides the sweetening degree. They are a source of carbohydrates and encourage the multiplication of useful bacteria in the digestive tract and provide people with energy.

The citric acid is an acidifier acting as a preservative and protecting colour and flavour. It can also chelate metals that can alter colours and flavours. The citric acid also plays a part in stabilizing the products' flavour by inhibiting the oxidative attack against flavour components and at the same time, by inhibiting the unpleasant smell of products [2].

The sodium citrate is a buffer substance in regulating the drink's pH, while the Magnesium Hydrogen Citrate is a soluble salt used as a magnesium source in soft drinks. This is a vital mineral substance that cannot be synthesized by the human body. Thus, the magnesium must be ingested. The magnesium helps muscle cells to function, it contributes to the good function of the heart, it helps lower stress hormone levels (Adrenalin) and induce calm. The magnesium addition ensures a normal functioning of the enzymatic system.

The flavours give the product its unique identity and character. The flavour is a blend of balanced aromatizing compounds that send a correct signal to the consumers' sensitive receptors. Aromatized waters only include natural flavours and natural flavour substances exclusively

obtained by physical processes from fruits in their natural states or processed for human consumption. Natural flavours are extracted with water or other solvents from different plant parts such as fruits, seeds or leaves and then purified.

The ascorbic acid is the most popular antioxidant in fruit juice industry. Reactive oxygen species oxidize ascorbate to dehydroascorbate. The addition of carbon dioxide or nitrogen to bottled or wrapped drinks reduces oxygen from the top space of bottles thus preventing oxidation [3].

Carbonation is the process of adding carbon dioxide to a liquid substance. CO_2 is an inert gas, virtually tasteless, with a stingy, spicy smell and which is available at a reasonable price [4]. It is soluble into liquid (the degree of solubility increases with the decrease of the liquid's temperature). When dissolved into water, it forms carbonic acid. The acid taste is given by the carbonic acid and it depends on the product. The quantity of carbon dioxide which is dissolved gives the drink its effervescence and it completes the flavour of the drink.

Inulins are a group of oligosaccharides containing fructose. They belong to the class of fibres known as fructans. They are found in Chicory roots (*Cichorium intybus*) and Jerusalem artichokes (*Helianthus tuberosus*). They mainly comprise fructose units with a molecule of terminal glucose, as a non-reducing polymer. Inulins stimulate the growth of *Bifidobacterium sp.* in the thick intestine. Inulin is used more and more in foodstuffs, due to its special nutritional and functional characteristics. Inulin increases calcium absorption and possibly magnesium absorption, while promoting the growth of intestinal bacteria. Nutritionally, it is considered a form of soluble fibre and is sometimes seen as a prebiotic.

The preservatives are added in most soft drinks in order to protect the flavour, prevent alteration and extend the validity term. Although, now, the bottling conditions in the modern factories are hygienic, it is almost impossible to completely eliminate microorganisms through pasteurizations.

In the soft drinks industry, the hygiene and microbiological quality are important performance criteria. Quality control for chemical and biological balance must be adapted o this evolution through modern control methods.

The main requirements imposed to a practical method of microbiological control range from allowing to detect traces of contamination in quantity and as can be reproduced, to applying it efficiently and economically under various circumstances.

The aim of the paper is to identify the type and optimum dosage of preservative necessary to preserve in time the qualities of aromatized waters with functional ingredients added.

Experiments

Six samples were prepared using the following raw matters: 50 g/L natural juice sweetener (S.U.≈70^0Brix), 1,5 g/L citric acid solution 50%, 0,15 g/L sodium citrate, 2,5g/L inulin, 1,846 g/L Magnesium Hydrogen Citrate, 0,7 g/L natural fruit flavour and 2 g/L food carbon dioxide. Ascorbic acid and preservatives: sodium benzoate and potassium sorbate were added in variable proportions according to table no. 1.

Table 1. Sample preparation

Sample / Raw matters	S1	S2	S3	S4	S5	S6
Sodium benzoate (A), g	0,15	0,2	0	0	0,15	0
Potassium sorbate (B), g	0	0	0,15	0,2	0,15	0
Ascorbic acid, g	0,1	0,1	0,1	0	0	0
Partially decarbonated water, mL	958,53	957,98	957,926	958,23	958,08	957,93

The ingredients were added under stir, pasteurized for 30 seconds at 85^0C and then partially decarbonated and de-mineralized water is added (carbon dioxide content of 2 g/L) and bottled cold in Polyethylene terephthalate bottles.

He samples thus prepared were stored in various conditions for five days: at the room temperature (T_{cam}), at high temperatures, in a drying and heating oven (30^0C, respectively 50^0C). The organoleptic and microbiological analysis aimed to identify how preservatives worked (yeasts and fungi-Y&F, the total number of germs-TNG) [5,6]. The samples were brought in advance to the room temperature and then analyzed for sensitivity and microbiology.

For the microbiological analysis of nectar, *yeasts and fungi (Y&F)* are grown on *Orangeserum Agar*. Incubation takes place at room temperature (20-25^0C), for 2-5 days, and then they are counted.

The total number of germs-TNG in fruit content juices is based on seeding the product by incorporating it into the growth environment *Standard Agar*, followed by incubation at 37^0C for 48±2 hours and the count of colony forming units developed under the given circumstances.

Results and discussions

The added functional ingredients and preservatives did not present problems at dilution and did not influence the drink's aspect.

Tables 2 and 3 present the results of the sensitivity and microbiological analyses for the samples.

Table no. 2

Results of the organoleptic test for the studied samples

Sample	After preparation	T_{cam}	T=30^0C	T= 50^0C
S1	colourless, specific taste	colourless, specific taste	yellowish hue, specific taste	yellowish hue, the taste has changed
S2	colourless, specific taste	colourless, specific taste	yellowish hue, slightly acid taste	yellowish hue, the taste has changed
S3	colourless, specific taste	colourless, specific taste	yellowish hue, slightly acid taste	yellowish hue, the taste has changed
S4	colourless, specific taste	colourless, specific taste	yellowish hue, slightly acid taste	yellowish hue, the taste has changed
S5	colourless, specific taste	colourless, specific taste	Slightly yellow, the taste has changed	yellowish hue, the taste has changed
S6	colourless, specific taste	colourless, specific taste	Slightly yellow, gust acid	yellowish hue, the taste has changed

The exposure to high temperatures influences the colour and the taste of the drink in a negative way. Thus, the organoleptic analysis allows establishing the optimum storage temperature for these products.

Tabel no. 3

Results* of *the laboratory microbiological exam for the studied samples

Analysis / Sample	After preparation		T_{cam}		T=30^0C		T=50^0C	
	Y&F/ml	*TNG[CFU/ml]*	*Y&F/ml*	*TNG[CFU/ml]*	*Y&F/ml*	*TNG[CFU/ml]*	*Y&F/ml*	*TNG[CFU/ml]*
S1 - *0,15 g/L (A)*	1	100	12	59	0	40	0	0
S2 - *0,20 g/L (A)*	2	6	3	10	0	4	0	0
S3 - *0,15 g/L (B)*	0	100	2	50	0	9	0	0
S4 - *0,20 g/L (B)*	**2**	**6**	**1**	**2**	**0**	**1**	**0**	**0**
S5 - *0,15 g/L(A)+ +0,15 g/L(B)*	0	100	2	44	0	26	0	0
S6 – *no preservatives*	80	200	14	*uzb*	0	*uzb*	0	1

uzb – individualized colonies, many; countless

The maximum allowed values for the microbiological parameters of soft drinks to be considered safe for consumption from a microbiological perspective are: *TNG* < 30, *Y&F* – absent.

a) Y&F *b) TNG*

Figure 1 - Microbiological control for sample no. 4 kept for 5 days at room temperature

The microbiological analyses taken right after preparation are presented in comparison with those taken 5 days after the preparation (table 3). Depending on the storing temperature, five days later, the microbes' multiplication is slower in the samples containing preservatives: sodium benzoate (P2) and potassium sorbate (P4) in larger quantities.

At the room temperature, the enzymatic and microbiological reactions take place sooner, which leads to the quick decay of the drink and confirms the high microbial load of samples kept at the room temperature compared to the rest of the samples.

By exposing the samples to higher temperatures 30^0C, namely 50^0C (drying and heating oven), the microbes' multiplication is slowed. However, after five days of storage at high temperatures, the product's organoleptic characteristics (colour, taste, smell) are affected. Thus, the product's colour and taste change.

Conclusions

The results of the microbiological analyses confirm the need to add preservatives to this type of products, as they inhibit the development of microorganisms under normal storage conditions.

A compared analysis of the values of microbiological parameters for the samples stored in various conditions, we can notice that the sample S4 with added 0,2 g/L Potassium sorbate has the smallest microbial load in all tested conditions. From an organoleptic viewpoint, there is a change in colour (yellowish hue) and taste (more acid, slightly astringent after it has been kept for five days at 30^0C, respectively 50^0C.

As concerns the sodium benzoate, one can partially notice the efficiency of the preservative, as the product presented a large microbial load (*TNG =100*) immediately after preparation (no growth is observed). This can be noticed in the case of using both preservatives (sample P5). From an organoleptic perspective, we can also notice a change in colour and taste.

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