DETERMINATION OF THE QUALITY PARAMETERS OF DRINKING WATER USED IN BAKERY INDUSTRY

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Abstract

The goal of the paper is increasing food safety through the improvement of the drinking water quality used in processing and distribution of food products. Provide water that is safe and adequate from the perspectives of technological requirements in every stage of food processing/distribution. Drinking water used in the fabrication processes of the bakery products must meet the quality conditions imposed by law nr. 458/2002, changed in 2004. The researches were carried out in 2012, in a bakery unit localized in Bihor County. The laboratory analysis were made in the Hygiene Laboratory of the Faculty of Environmental Protection, Oradea. The water samples have accomplished the quality conditions imposed by the normative.

Key words: water, quality, hygiene, bakery products.

INTRODUCTION

The quality of water used in the production of bread and bakery products must be drinking water quality. This property is ensured through compliance with quality parameters, which are microbiological and physical-chemical. Water quality has an impact on food quality and safety, winch is transferred on finished product. Food processors need large quantities of good quality water for a range of operations, including blending or mixing, cleaning, ice making, steam production and product transport. Each processor shall have and implement a sanitation standard operating procedure (SSOP) that addresses sanitation conditions and practices before, during, and after processing. Any water that contacts food or food-contact surfaces shall be safe and of adequate sanitary quality. Running water at a suitable temperature, and under pressure as needed, shall be provided in all areas where required for the processing of food, for the cleaning of equipment, utensils, and food packaging materials or for employee sanitary facilities."[FDA]

Most processors draw water from city water supplies or wells. The assumption is that these are safe sources but this needs to be verified. There are many operations around the world that draw from rivers or other sources and must treat water on site to assure its sanitary quality. Most food processors use hot water for cleaning and other operations. Processors should always request that the city provide them with water test results. These results are those obtained at the water treatment facilities. Having city water records does not preclude the processor from testing water from their

own operations, however. If water from multiple sources is being used (wells, city or wherever), be sure that samples from each source are tested. Both microbiological and chemical parameters should be tested. Chemical tests should include pH, water hardness, heavy metals, pesticides, iron and nitrates.

Water samples for complete chemical analyses should collected at least once a year and submitted to a recognized water testing laboratory. Understanding water chemistry can benefit the processor in many ways. For example, baked goods do not contain large amounts of water but the chemistry of the water can affect doughs or batters, and eventually the finished baked good.

Water acts as a solvent for salt, leavening chemicals, sugars, emulsifiers and all polar molecules. Water may also contain dissolved minerals, organic matter, gases, and microbial contaminants. All of these factors are important to the bakery for overall quality assurance and sanitation. The amount and type of mineral salts present in water is very important to the baker. The degree of hardness is generally expressed as hard, soft, saline or alkaline. The specific composition is expressed in parts per million (ppm) of the dissolved hardness-causing minerals, mainly calcium and magnesium salts.

MATERIAL AND METHODS

Drinking water used in the fabrication processes of the bakery products must meet the quality conditions imposed by law nr. 458/2002, changed in 2004.

The purpose of the work was the monitoring of the hygienic quality of the drinking water used in a bakery unit. The researches were carried out in 2012, in a bakery unit localized in Bihor County. The laboratory analysis were made in the Hygiene Laboratory of the Faculty of Environmental Protection, Oradea.

On the basis of the standard SR EN 1622/2000 was determined odor and taste treshold of the drinking water samples, at 25^0C. The color of the water was determined according to the standard SR 7887/2002; turbidity according to the standard SR EN ISO 7027/2001.The method used for determination of the nitrite content was molecular absorption spectrometry (SR EN 26777/C91/2006) and for the nitrate content was used the spectrometric method according to the standard SR ISO 7890-1/1998. The hardness of the drinking water was determined according to the standard SR EN ISO 6059/2008 and pH values according to ISO 10523:1997.

RESULTS AND DISCUSSION

In january, march and may 2012, have been made visits at bakery unit from Bihor County. To study the microbiological quality of potable water used for the manufacture of the bakery products water samples were collected from the tap water coming into the bakery unit. This unit has own source of water supply. The results of the physical and chemical analysis are presented in the following.

Table 1

Physical and chemical analysis of the drinking water collected from the bakery unit

Physical and chemical determination	Unit of measure	The results of analysis			Allowed values
		16.01. 2012	16.03.2012	23.05.2012	
Taste	-	0	0	0	Acceptable to consumers
Odour	-	0	0	0	Acceptable to consumers
Colour	points	0	0	0	Acceptable to consumers
Turbidity	points	0	1	2	max. 5
Nitrite	mg/l	-	0,014	0,1	max. 0,5
Nitrate	mg/l	9,8	24,65	19,1	max. 50
Total hardness	-	18,40	13,46	17,60	min. 5 – max. 20
pH	pH units	7,035	7,132	7,62	6,5-9,5

Water can dissolve many different substances, giving it varying tastes and odors. Humans and other animals have developed senses which (more or less) enable them to evaluate the potability of water by avoiding water that is too salty or putrid. Humans also tend to prefer cold water to lukewarm water since cold water is likely to contain fewer microbes.

Alkali taste can appear on high hardness of the water, with high total dissolved solids content or high alkalinity. Earthy, musty, grassy, fishy, vegetable and cucumber taste and odors are commonly caused by seasonal occurrences when organic matter such as plants or algae are more prevalent in lakes, reservoirs, and the canals that deliver the water to water treatment facilities. These things are removed as the water is treated but harmless residual odors will remain in the water (in much the same way as the aroma of roses will remain in a room long after the roses have been removed). With current treatment technologies, the odor causing

compounds are difficult to remove. The detection of residual odors is dependent upon an individual's olfactory sensitivity. Many people may never detect them, while others who are sensitive may detect the musty/moldy taste and smell at levels below instrument detection levels.

Medicinal, chlorines, bleach, or chemical taste/odour causes can be the addition of chlorine to the water by the public water supplier or the interaction of that chlorine with build-up of organic material in the plumbing system itself. The latter can be identified if the smell/taste disappears within minutes after opening the faucet or if it only appears at one of several faucets.

Most common cause for metallic taste in drinking water is the presence of iron (at levels over 0.004 mg/L) and/or copper (2-5 mg/l) which can lead into water from pipes. Zinc (4-9 mg/L) and manganese are noticeable at higher concentrations and are less common causes. For the petroleum or oily smell most likely cause is gasoline or oil contamination, but also thinkable are nuisance bacteria. In coastal areas a salty taste may be the indication for ocean water intruding into the fresh water system. For users of private wells it leakage from road salt application can be a rare cause. Usually the salty taste has natural causes as natural occurring sodium, potassium and/or magnesium.

For the sulfurous, decayed, sewage like taste/odour the most common cause of this type of problem can occur in the drain when organic matter (soap, food waste and hair) accumulate on the walls of the drain and thus enhance biofilm formation. Biological degradation of organic matter by bacteria can cause those smells, which can also affect the taste sense. Another cause can be sulfur-reducing bacteria growing inside of a water heater when the hot water remains unused for longer periods of time

Taste and odour of the potable water samples collected from the bakery unit from Bihor County was acceptable to consumers and did not submit changes.

Infinitely small microscopic particles add color to water. Colloidal suspensions and noncolloidal organic acids as well as neutral salts also affect the color of water. The color in water is primarily of vegetable origin and is extracted from leaves and aquatic plants. Naturally water draining from swamps has the most intense coloring. The bleaching action of sunlight plus the aging of water gradually dissipates this color, however. All surface waters possess some degree of color. Likewise, some shallow wells, springs and an occasional deep well can contain noticeable coloring. In general, however, water from deep wells is practically colorless. An arbitrary standard scale has been developed for measuring color intensity in water samples. When water is rated as having a color of 5 units, it means: the color of this water is equal in intensity to the color of distilled water

containing 5 milligrams of platinum as potassium chloroplatinate per liter. U.S. EPA Secondary Drinking Water Regulations recommend that a potable water possess color of less than 15 units. In general, color is reduced or removed from water through the use of coagulation, settling and filtration techniques. Aluminum sulfate is the most widely used coagulant for this purpose. Superchlorination, activated carbon filters and potassium permanganate have been used with varying degrees of success in removing color.

The potable water collected from the monitored bakery unit did not presented any abnormal change and had 0 point. Also, the values of turbidity, pH, nitrite and nitrate were according to the standards in force regarding the quality conditions of the potable water (Low nr. 458/2002, changed in 2004).

CONCLUSIONS

Water is an essential ingredient. In a bakery product all ingredients interact among one another at the molecular and atomic levels to give the final texture, flavors, taste, aroma, character etc. Finally water influences the organoleptic properties of the bakery products.

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