

MONITORING OF HYGIENIC QUALITY OF POTABLE WATER IN FOOD INDUSTRY

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Abstract

Samples of potable water were assessed using their physical and chemical parameters as indices. The organoleptic properties including appearance, odor and taste were used for the physical assessment. The chemical properties such as turbidity, pH, total hardness, concentration of nitrates, nitrites and residual chlorine were determined with standardized methods. All the water samples were clear and without color, odor and taste with pH value ranging between 7.30-8.64. The chemical parameters values obtained in the water samples from monitored food units were all within the normative recommendations. The public health importance of using potable water in food industry and the implications of the sanitary condition of the food units on the water quality are discussed in the text.

Key words: water, quality, hygiene.

INTRODUCTION

Today, water the most precious resource is generally contaminated with many kinds of impurities such as organic, inorganic contaminants and micro organisms. For this reason water is one of the most comprehensively regulated areas of EU environmental legislation. It was therefore necessary not only to adapt the original directive to bring it in line with the current scientific and technical progress, but also to bring it into accordance with the principle of subsidiarity by reducing the number of parameters that member states were obliged to monitor and by focusing on compliance with essential quality and health parameters. Potable water is widely used in the food industry for many purposes. Its quality should be assured in the same way as any other raw material or ingredient. A quality assurance programme for water should cover its source, its treatment and its distribution and storage within the factory, and include regular checks for compliance with internal or legislative standards (Diersing and Nancy, 2009).

MATERIAL AND METHODS

The research was conducted in 2009 and 2010, in 4 units in food industry: Food Unit A, Food Unit B which are milk factories and Food Unit C, Food Unit D (meat factories). Food Units A, B and C are placed in Bihor County while Food Unit D is placed in Satu Mare County.

To study the hygienic quality of potable water used in food industry, water samples were collected from certain control points such as: drilled

well water, 200 meters depth (Food Unit A and D) and tap input unit (Food Unit B and C).

Physico-chemical analysis of water was accomplished corresponding with the methodology approved by the Laboratory of Sanitary Chemistry within the framework of Public Health Department of Bihor county. Part of the analysis were made as well in the Hygiene Laboratory of Environmental Protection Faculty, University of Oradea.

RESULTS AND DISCUSSION

In the following will be presented the results of physico-chemical analysis of potable water samples collected from the milk and meat factories. Numerical results of analysis are expressed in tables and are compared with the maximum limits set by into force legislation.

Table 1

Monitoring control: drilled well water, 200 meters depth, Food Unit A

Crt. nr.	Physico-chemical parameters	Unit of measure	Monitoring period / Results of analysis					Allowed values
			I 06.07.'09	II 05.10.'09	III 11.01.'10	IV 05.04.'10	V 05.07.'10	
1	Taste		0	0	0	0	0	no changes
2	Odor		0	0	0	0	0	no changes
3	Color	degrees	0	0	0	0	0	no changes
4	Turbidity	degrees	0	0	2	0	0	max. 5
5	Nitrite	mg/l	0.2	0.1	0.1	0.2	0.05	max. 0.5
6	Nitrate	mg/l	20.0	18.5	19.1	19.0	18.9	max. 50
7	Total hardness	german degrees	17.50	18.40	17.60	18.50	17.33	min. 5 – max. 20
8	pH	pH unit	7.44	7.56	7.62	7.64	7.55	6.5-9.5
9	Residual chlorine	mg/l	0.23	0.45	0.35	0.15	0.25	max. 0.5

Table 2

Monitoring control: potable water, tap input unit, Food Unit B

Crt. nr.	Physico-chemical parameters	Unit of measure	Monitoring period / Results of analysis					Allowed values
			I 06.07.'09	II 05.10.'09	III 11.01.'10	IV 05.04.'10	V 05.07.'10	
1	Taste		0	0	0	0	0	no changes
2	Odor		0	0	0	0	0	no changes
3	Color	degrees	0	0	0	0	0	no changes
4	Turbidity	degrees	1	0	2	0	0	max. 5
5	Nitrite	mg/l	0.01	0.06	0.05	0.04	0.01	max. 0.5
6	Nitrate	mg/l	1.38	1.50	2.15	2.0	2.9	max. 50
7	Total hardness	german degrees	4.48	4.56	5.04	6.05	7.39	min. 5 – max. 20
8	pH	pH unit	8.17	8.56	8.62	8.64	8.55	6.5-9.5
9	Residual chlorine	mg/l	0.023	0.045	0.030	0.016	0.25	max. 0.5

Table 3

Monitoring control: potable water, Food Unit C

Crt. nr.	Physico-chemical parameters	Unit of measure	Monitoring period / Results of analysis					Allowed values
			I 07.07.'09	II 06.10.'09	III 12.01.'10	IV 06.04.'10	V 06.07.'10	
1	Taste		0	0	0	0	0	no changes
2	Odor		0	0	0	0	0	no changes
3	Color	degrees	0	0	0	0	0	no changes
4	Turbidity	degrees	0	0	2	1	1	max. 5
5	Nitrite	mg/l	0.04	0.06	0.01	0.03	0.04	max. 0.5
6	Nitrate	mg/l	0.1	0.01	0.12	0.19	0.23	max. 50
7	Total hardness	germ.deg.	5.61	5.66	5.74	6.05	5.83	min. 5 – max. 20
8	pH	pH units	7.75	7.56	7.60	7.30	7.80	6.5-9.5
9	Residual chlorine	mg/l	0.2	0.45	0.30	0.16	0.25	max. 0.5

Table 4

Monitoring control: drilled well water, 200 meters depth, Food Unit D

Crt. nr.	Physico-chemical parameters	Unit of measure	Monitoring period / Results of analysis					Allowed values
			I 07.07.'09	II 06.10.'09	III 12.01.'10	IV 06.04.'10	V 06.07.'10	
1	Taste		0	0	0	0	0	no changes
2	Odor		0	0	0	0	0	no changes
3	Color	degrees	0	0	0	0	0	no changes
4	Turbidity	degrees	1	2	0	1	0	max. 5
5	Nitrite	mg/l	0.4	0.3	0.4	0.4	0.1	max. 0.5
6	Nitrate	mg/l	24.3	26.5	30.1	31.0	30.9	max. 50
7	Total hardness	g. degrees	9.48	10.55	12.44	11.50	13.37	min. 5 – max. 20
8	pH	pH units	8.27	8.55	8.62	7.93	8.04	6.5-9.5
9	Residual chlorine	mg/l	0.3	0.4	0.3	0.1	0.2	max. 0.5

Physico-chemical analysis of potable water samples collected from monitored food units reveals that analyzed water corresponded to water quality standards, has no color changed and particular taste and smell characteristic of an pollutant contamination. (table 1,2,3,4). Also, other physico-chemical analysed parameters values such as turbidity, nitrite, nitrate, total hardness, pH and residual chlorine were included in the maximum permissible limits for potable water quality. Making a comparative analysis of water quality used in monitored food units is found that the highest concentrations in nitrates, nitrites and residual chlorine were determined in water samples collected from Food Unit D. The lowest

concentrations in nitrates and nitrites were determined in potable water samples collected from Food Unit C.

CONCLUSIONS

The result of this study shows that all the samples from the four different food units were not chemically polluted as almost all the values obtained for both the organoleptic and the physico-chemical analyses were within the recommended values (Law 311/2004 and G.D. 974/2004).

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