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COMPARATIVE ASSESSMENTOF SOME WATER KINDS IN OUR COUNTRY AT THE SOURCE, DURING THE TECHNOLOGICAL PROCESS, UP TO PRODUCTION-READY

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Abstract
Water is one of the main ingredients for consumption and for use in the food industry, it has a high strength solvent to salts therefore, depending on the chemical composition of the layers from which water passes, enriched with various substances and thus has a content of different chemical. Water used for consumption and industry should be drinking; such a characteristic is determined by the requirements of different nature, such as those organoleptic, chemical and bacteriological. Liquids the temperature falls shrink and lose volume. By lowering the temperature and density increases so that those parts are made more severe cold. For this reason, solid state liquids are heavier than their normal states of liquid. Water than from all other juices falling shrink to a certain temperature (+40C) and then immediately abruptly begins to swell. When it freezes, it expands even more. For this reason the solid water is easier than its liquid state. So, instead of ice water swim by the laws of physics should sink to the bottom of it.With the ice melting or evaporating water absorbs heat withdrawn from the surroundings. When the opposite happens, the heat given off. This action represents the physical action called "hidden heat". All fluids possess hidden heat. Only heat the water that is regarded as the highest of all. Thermal capacity of water, ie the amount of heat (energy) the right to increase the water temperature one degree, is higher compared to all liquids. The thermal conductivity of water, ie the ability of heat conductivity compared with other fluids is almost four times greater. Water should be easier and less mineralized. The amount of minerals dissolved in water is a basic indicator for the natural mineral water, the label in the form of parameter "dry residue at 180C in mg / l". The lower this value is, the better is the water. This study takes into account the scientific evidence of the above, where the resources at any time of the year there are no variable composition and chemico-physical and to maintain equal treatment of the quality regulated by the technological process from storage, filtering varied and up on the packaging.
Key words: *Water, water features, resources, water quality*

1. Introduction

Water, not only is the main component of the human body, but he is also one of the three elements (earth, water, air) of life on our planet. Overcrowding of the main cities of the country after 1990 and its focus on large urban centers, increased more and more the necessity of providing drinking water. The lack of drinking water to informal settlements and the more the risk of pollution from land existing as well as from the air, always adds more "drink water". Today more and more insurance to the consumer water is made in the form of packaged to ensure its quality. The variety of pollutants in the environment often causes the change of the physical, chemical and microbiological natural source.

Increasing Food Standard of living increases, the demand for bottled drinking water. The world market for bottled water has a consumption exceeding 89 billion liters per year. Western

Europeans are the biggest consumers in the world of bottled water (85 liters/person/year). Classification of drinking water by the International Organization for Water (IOW) is as follows: natural mineral water, spring water and purified water (surface water or groundwater). Also, IOW for bottled water bottle takes into account four categories as artesian water, drinking water (tap) water, gas and water wells. Water characteristics significantly affect the development of the various stages of the process of technological processes and the quality of nutrition, so it is necessary to use an adequate water.

If you can not possess a suitable water for consumption, we should perform appropriate treatments to modify the characteristics or special operations, in order to avoid negative effects.

Among the key indicators necessary and drinking mineral water are:

The content of dissolved salts in water (mg/ l)	< 50	< 500	500 ÷ 1500	> 1500
Natural mineral water containing:	very low	low	medium	high

Mineral salts in water in the form of cations and anions. Usually cations and anions in the most important are: Ca^{+2}, Mg^{+2}, Na^{+}, Fe^{+2}, $HC0^{3-}$, $S0_4^{-2}$, Cl^{-}, and F^{-}. Their content is necessary in certain limits, while the surplus is harmful to human health. In general, their content must be according to the following indicators, inmg/l: canions: Ca^{+2}> 150, Mg^{+2}> 50, Na^{+}>200, Fe^{+2}> 1and anions: $HC0^{3-}$> 600, $S0_4^{-2}$> 200, Cl^{-}>200, F^{-}> 1, content of free $C0_2$according standardev should be > 250 mg / l.

In this article we are performed analysis and assessment Lajthiza and Bovilla water, some of these characteristics may come as a result of pollution of natural resources, the packaging that they are traded or technology of drinking water treatment.

2. Methodology of experimental work

- *Methods for determining the physico-chemical and microbiological indicators of natural mineral water and packaged.*

Among the main indicators analyzed, as physico-chemical characteristics of water microbiological, include: definition visual and organo - leptic, pH, remains dry, electrical conductivity, strength, determination of Ca^{+2}, Mg^{+2} and pollutants microbiological such as total bacterial load and the presence of fecal coliform bacteria. These indicators are determined by the method of cultivation terrains and selective standards.

- *The sampling method*

Samples for analysis were taken in accordance with the rules of sampling for analysis. They represent samples: water that is packaged in place, water packaged overseas (imports), as well as from the origin where packaged waters produced in place. Equipment used for the analysis of all physical-chemical indicators and bacteriological are: (Fig. 1, 2, 3, 4 dhe 5):

Fig.1 - Equipment 4421 conductometer

Fig. 2 - Equipment4424 pH-meterand measurement of chlorine

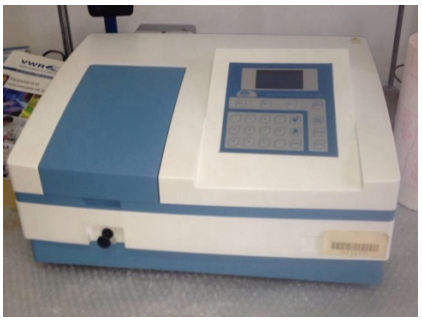

Fig. 3 -Equipment 4422 Turbo-meter for measuring turbidity **Fig. 4** -Equipment 4425 and 4426 ammoniaNH4+.

Fig. 5 -Equipment 4423 spectrophotometry.

Through these devices are defined as:
1. By conductometer determined electrolytic conductivity of water.
2. By pH-meter determined value of alkalinity.
3. By turbo-meter determined turbidity of the water.
4. By amonum-meter determined $NH4^+$ quantify.
5. By spectrophotometer determined thelight absorption measures.

By analogy should make sure that the concentration of organic substances extracted by chloroform (ECC), as his polycyclic aromatic hydrocarbons, should not exceed 0.2 mg / l and not have the presence of pesticides (Schedule 1).

Schedule 1. Characteristics required for drinking water.

The limit of acceptable substances or drinking water features		Maximum acceptable limit of toxic substances in drinking water		Acceptable limit of chemical substances in drinking water	
Parameter	Concentration or value limits	Parameter	Concentration or value limits	Parameter	Concentration or value limits
Smell	Pronounced	Arsenic (As)	0.05 mg/l	Iron (Fe)	0.2 mg/l
Color	100 unit	Barium (Ba)	1.00 mg/l	Magnesium (Mg)	50 mg/l
Blur	250 ppm in SO_2	Cadmium (Cd)	0.01 mg/l	Manganese (Mn)	0.5 mg/l
Ammonia (NH_4)	0.5 mg/l	Cyanide (CN)	0.05 mg/l	Copper (Cu)	0.1 mg/l
Copper (Cu)	1 mg/l	Chromium (Cr_6)	0.05 mg/l	Zinc (Zn)	5 mg/l
Zinc (Zn)	5 mg/l	Bullet (Pb)	0.05 mg/l	Chloride (Cl^-)	250 mg/l
Bullet (Pb)	0.05 mg/l	Selenium (Se)	0.01 mg/l	Fluoride (F^-)	1 mg/l
Cadmium (Cd)	0.005 mg/l			Nitrates (NO_3)	50 mg/l
Arsenic (As)	0.05 mg/l			Sulfate (SO^{2-}_4)	
Chrome (Cr_6)	0.01 mg/l			Detergents (ABS)	250 mg/l
Selenium (Se)	0.05 mg/l			Phenolic compounds (phenol)	0.3 mg/l
Cyanide (CN^-)	1 mg/l				0.0001 mg/l
Fluoride (F^-)	0.5 g/l				
Detergents (ABS)	0.3 mg/l				
pH	6-8.5				
BOD					
COD	10				
Nitrates (NO^-_3)	30				
Nitrates (NO_2)	50 mg/l				
	0.1 mg/l				

Water to be evaluated as drinking must have a constant temperature, ranging from 6 to 12 ° C, there should be no abnormal taste or odor even at 60 °C.Also there should be no color and should be fine.The clarity of the water is an indication of lack of insoluble substances, however this feature is very relative because they are very few waters that have not suspended substances (Schedule 1).Evaluation of suspended substances can be performed with a measurement of turbidity by turbidimetrit Jackson; The analysis results are expressed in units Jackson (rotected) which can be converted into other units through equivalency factors. According to the norms of the World Health Organization maximum turbidity should be in the 5 rotected.

Chemical analysis should enable the removal of fecal contamination originated, those organic and inorganic type; such information is obtained by performing analysis for the determination of organic substances, ammonium chloride (organic pollution in action), nitrites and nitrates (organic pollution distinct) and inorganic elements that may be present due to infiltration of emissions coming from the surrounding industrial areas.It is important, both from the standpoint of the consumer, as well as suitability of use in any industry, defined as insoluble salts and their composition. For this purpose, we need to know the power of a water classify in total, temporary and permanent.

The total power is determined by the concentration of calcium and magnesium salts; Temporary power is determined by the concentration of calcium and magnesium salts that are as bicarbonate, whereas the difference between these two types of power sets and found a permanent power of the calcium and magnesium salts that remain undigested in the water after it has been boiled. Measuring the power units are French, English and German, which are distinguished in this way:

- A French hydrometric grade corresponds to 1 g of calcium carbonate in 100 liters of water;
- A German grade of 1 g of calcium oxide corresponding to 100 liters of water;

- English grade corresponding to 1 g in 700 ml water carbonate.
Water power 5 degrees is classified as sweet, hardness between 5-20 degrees with normal, while above 30 degrees is considered very strong. Limits are normal hardness 30 ° F for total power and 12 ° F for the permanent, though sometimes in some areas quite often encountered obstacles blocking their piping or erosion.
Microbiological analysis of water intended to reveal drinking by determining the number and type of microorganisms. Currently the greatest risk appeared to drinking water is possible pollution from sewage wastewater that can filter through the soil into underground water, which enables the development of pathogenic bacteria in drinking water.
Indicator of fecal contamination is Escherichia coli, but since such a determination is not very simple, usually fecal coliform preferably determined.Other bacteria that are determined, which determines the presence of fecal contamination, are Streptococcus faecalis and Clostridium welchii; The latter features like sporigene allows to conclude that in their presence and in the absence of other pathogenic bacteria, pollution is not recent.Microbiological analysis, in addition to research for some other types of bacteria, have the potential to determine the number of bacteria in 100 ml of water; so the amount of pollution and type of microorganisms and to define the types of treatment measures we should take to make drinking water (Schedule 2).

Schedule 2. Distribution bacteriological water used by drinking water source.

Classification	Bacteria (ml water)
Water should be sterilized	0 – 50
Water should coagulate, filtered and sterilized	50 – 5000
Water requires a special treatment	5000 – 50000
The waste water, with no possibility of treatment and should seek other sources	> 50000

There are two methods for determining the physico-chemical parameters, methods UV-VIS spectro-photometry and volumetric methods. Also, from the microbiological laboratory analyzes performed total coliforms, fecal coliforms and fecal streptococcus, total microflora in 22˚C and 36˚C. For the first three tests of membrane filtration techniques used where 100 ml filtered water with the help of a vacuum filter apparatus, using membrane filters with a diameter of 47-50 mm, and pore size0.45 μm. Water filters filter content placed in Petri dishes with ready dehydrated, and random set on the thermostat.

3. Results and analysis

In this comparative study were obtained two types of groundwater in the country,Lajthiza and Bovilla water. Samples taken are taken from the source, the beginning of the technological process in the middle of the process and its conclusion. Chemical analysis carried enable the identification of fecal contamination originated, those organic and inorganic type; Such information is obtained by performing analysis for the determination of organic substances, ammonium chloride (organic pollution in action), nitrites and nitrates and inorganic elements that may be present due to infiltration of emissions coming from the surrounding industrial areas.
The quality of drinking water originating from Bovilla reservoir regularly followed by two laboratories, chemical and microbiological, set up near the treatment plant. These two labs perform regularly once or twice a day for about 19 tests physico-chemical parameters and six microbiological parameters (Schedule 1). In each laboratory carries untreated water and treated water; also measured several times a day some of the main parameters of water in the main stages of water treatment performance: the introduction, partitor, filters and exit the facility. At the same time, the electronic monitoring devices for untreated water and treated, automatic measured parameters, such as pH, temperature, turbulent, conductivity, chlorine free; data reflected in the central server, which

supervises the entire process automatic water purification technology. We note that the methods used by us are in accordance with European standard 80/778 and STASH Albanian Standard 3904: 1997 (Decision 145, 1998) (Schedule 1, 2 and 3), the quality of water consumed by man.

Schedule 1 –Physico-chemical evaluation of Bovilla water.

Parameters	Measurement Unit	Norma	Untreated water of Bovilla	Treated water of Bovilla
Water temperature	^{0}C	-	14.6	13.5
Smell / taste	Normal	-	Normal	Normal
Concentration of H^+ ions	pH unit	6.5-9.5	8.1	8.05
Turbidity	FTU(NTU)	< 1.0	0.42	0.01
Electrical conductivity	µs/cm 20 ^{0}C	2500	280	340
The total alkalinity	mg/l $CaCO_3$		144.5	144.5
Total hardness	^{0} German	10-20	7.92	7.92
Free residual chlorine	mg/l Cl_2	0.5	-	0.76
Dissolved oxygen	mg/l O_2	≥ 8	8.70	10.50
Organic substances $KMNO_4$	mg/l O_2	5	0.94	0.55
Calcium	mg/l Ca	200	39.0	39.0
Chlorides	mg/l Cl^-	250	6.02	12.76
Sulphates	mg/lSO_4^{2-}	250	24.90	24.90
Ammonia	mg/lNH_4+	0.1	0.009	0.00
Nitrites	mg/lNO_2^-	0.5	0.006	0.00
Nitrates	mg/l NO_3^-	50	0.94	0.96
Phosphates	µg/l P_2O_5	-	48.97	13.60
Sulfides	µg/l H_2S	-	8.54	0.00
Aluminium	mg/l Al^{3+}	0.2	0.016	0.040
Iron	µg/l Fe	200	47.7	0.00

Drinking water plant Bovilla - Tirana, chemical water analysis (CMD. Nr 379, date 25/05/2016)

Schedule 2 –Lajthiza waterin June, July and August.

Parameters	Measurement Unit	Norma	DEPOT	Filter 1 mm	Filter 0.2mm	Final product
Water temperature	^{0}C	8-15	14.6	13.5	13.5	13.5
Smell / taste	Normal	Acceptable	Normal	Normal	Normal	Normal
Concentration of H^+ions	pH Unit	6.5-9.5	7.3	7.2	7.2	7.4
TΔS	-	-	60	70	60	60
Total Hardness	0 German	10-20	5.36 ^{0} Water	4.42 ^{0}Water	4.39 ^{0}Water	6.27 ^{0}Water
Calcium	mg/l Ca	200	42.1	38.2	29.7	21.05
Chlorides	mg/l Cl^-	250	14.07	13.6	12.9	12.05
Sulphates	mg/lSO_4^{2-}	250	12.6	11.38	0.00	0.0
Ammonia	mg/lNH_4+	0.1	0.0089	0.00	0.00	0.00
Nitrites	mg/lNO_2^-	0.5	0.0016	0.001	0.00	0.00
Nitrates	mg/l NO_3^-	50	0.98	0.86	0.67	0.576
Magnesium	mg/l mg	125	2.43	2.43	2.43	2.32

Bicarbonate	mg/l	-	85.4	73.2	71.3	48.9
Iron	µg/l Fe	200	38,5	23.6	0.00	0.00
Organic substances	$KMnO_4$	5	066	036	0.12	0.01
Phosphates	µg/l P_2O_5	-	48.97	13.60		
Sulfides	µg/l H_2S	-	8.54	0.00		
Aluminum	mg/l Al^{3+}	0.2	0.016	0.040		

Schedule 3 - Lajthizawater in December, January and February.

Parameters	**Measurement Unit**	**Norma**	**DEPOT**	**Filter 1 mm**	**Filter 0.2mm**	**Final product**
Water temperature	^0C	8-15	5-12	12.5	12.8	13.6
Smell / taste	Normal	Acceptable	Normal	Normal	Normal	Normal
Concentration of H^+ions	pH Unit	6.5-9.5	7.1	7.06	7.09	7.1
TΔS	-	-	60	70	60	60
Total Hardness	0 German	10-20	3.36 ^{0} Water	3.36 ^{0}Water	3.36 ^{0}Water	5.32 ^{0}Water
Calcium	mg/l Ca	200	36.2	33,04	29.1	20.04
Chlorides	mg/l Cl^-	250	12.05	12.05	12.05	12.03
Sulphates	mg/lSO_4^{2-}	250	11.62	10.37	0.00	0.0
Ammonia	mg/lNH_4^+	0.1	0.0074	0.00	0.00	0.00
Nitrites	mg/lNO_2^-	0.5	0.0015	0.001	0.00	0.00
Nitrates	mg/l NO_3^-	50	0.98	0.86	0.67	0.688
Magnesium	µg/l H_2S	125	2.83	2.76	2.43	2.47
Bicarbonate	mg/l Al^{3+}	-	75.4	68.2	88.3	51.4
Iron	µg/l Fe	200	37,5	21.7	0.00	0.00
Organic substances	$KMnO_4$	5	066	036	0.12	0.12
Phosphates	µg/l P_2O_5	-	48.97	13.60		
Sulfides	µg/l H_2S	-	8.54	0.00		
Aluminum	mg/l Al^{3+}	0.2	0.016	0.040		

Data from monthly averages in Schedule 1 note that untreated water of Bovilla stands for the highest content of nitrite; all seasons, at 7-14 °C temperature ranges, features which is very acceptable especially in the hot summer season. The data of Schedule 2 and 3 shows that Lajthiza water has contents higher carbonates, of ammonium and organic matter during the hottest months, which when crossing the technological process of infiltration, all these indicators move on rates allowed standard.

Details of the above statements (Schedule 1, 2 and 3) indicate that:

T - The water temperature in the two measurements performed on two sources: Bovilla-Lajthizaranging in T = 7.73 - 16.5 ^{0}C, this indicator is within the norm (norm 8-15 to 20 0C).

pH of groundwater monitoring sources ranging: Lajthiza waterfrom 77.73-7.8 to 7.52-8.59 of Bovilla water. The rate allowed for drinking water this indicator is within the norm: (pH = 6.5-8.5). Changes in two sources varies: 0.03 to 0.07 till 0.19. Normal pH has Lajthiza water based on the final results.

Fp - Total Hardness Fp in water Lajthiza ranging 5.72-11.16 ^{o}German, while Bovilla water ranging in 8.14-12.32 ^{o}German. The water is within drinking water standard (optimal rate is 10-20 ^{o} Germany, where the maximum allowed content is 25 ^{o} German).

Ca - The content of calcium in Lajthiza water ranging 17.04 – 34.13mg/l,while in Bovilla water content of Ca ranging in 21.04 - 63.13 mg/l. Boville water remains after processing of higher amounts of Ca, compared with Lajthiza water.

Mg - The content of magnesium in two sources of water after processing is: 6.08 - 2.6 in Lajthiza water and 18.6 - 35.38 mg/l in Bovilla water.

Fe - The content of iron in two sources is: 0.07 - 0.00 µg/l Fe in Lajthiza water, and 38.3-0 deri 0.06 µg/l Fe in Bovilla water. The final content is slightly above the recommended rate in the second stage of monitoring.

NH_4 - In the first stage of obtaining water from the water source of Lajthiza the ammonia content is 0.01 mg/l; content is below the max allowed: 0.05 mg / l. In the second post-processing phase the content of NH_4 is 0.00 mg / l. In the first phase the content of ammonia NH_4 in Bovilla water is 0.015 mg/l, while the ammonia content after production is 0.011 mg/l, above the recommended content.

Cl - The content of chlorine in Lajthiza water is 0.00 mg/l. In Bovilla water the content of Cl^- ranging from 5:33 - 17.75 mg/l. Cl^- content is much higher than in Lajthiza water.

SO_4 -The content of sulfates in Lajthiza water after processing reaches in 9.8 mg/l. In Bovilla water the content of sulphate is 9.05 - 27.57 mg/l. Sulphatecontent is within the recommended standard.

NO_3 - Nitrate content in Lajthiza water is small and varies between 0.08-688 mg/l. In Boville water the nitrates content varies between 0.7-19.25 mg/l. NO_3content is within the recommended standard.

O_2 - The content of oxygen in two stages of monitoring varies in 1.01 - 2.4 mg/l for the two types of water.

Analysis for microelements: Ni, Mn, Zn, Pb, Cu, Co, Cr.Cd. In this analysis has microelements content in two stages of monitoring: Ni = 0.005 - 0.002 mg/l, Mn = 0 - 0.001mg/l, Zn = 0.002 - 0.007 mg/l, Pb = 0 - 0.03 mg/l, Cu = 0.005 - 0.001 mg/l, Co = 0.007 - 0.04 mg/l, Cr = 0.045 – 0.000 mg/l, Cd = 0 - 0.001 mg/l.

4. Conclusions

1. Change of ions SO_4^{2-} and HCO^{3-} depending on the content of ions Ca^{2+} and Mg^{2+},in addition to the content of calcium and magnesium ions, no matter the quality of the natural mineral water content of anions.This is connected with the content of calcium ions and magnesium.So the reduction of ions Ca^{+2},low content of sulphate anions.The content of F^- ions is desirable levels, while in terms of the content of nitrate (NO^{3-}) in water they vary in levels of 0,5-4,9 mg / l (standards are $N0^{3-}$<10 mg / l). Water with such content is considered high quality.

2. Based on physical-chemical indicators in general result that those waters are suitable to be used for consumption. On the basis of studies conducted (Schedule1, 2 and 3), referring to the physical and chemical indicators, it turns out that the source country waters Lajthiza and Qafshtama are suitable to be used for children.

3. During the study two sources of origin of the natural mineral waters of the country, Bovilla and Lajthiza, was met comparative evaluation between indicators of Marketing (TSM), bottled water

(UAA) and the origin (UBA). Referring indicators environment (pH) of Lajthiza water, we can say that they have a pH value within EU norms which are 6.5 - 8.5, while refer to the content of salts, residue that dry, they have a content ranging from 120-220 mg/l (standard referred to 0-1500 mg/l). The exception is Bovilla water here,, where the salt content reaches up to 960 mg / l.

4. Another indicator of good quality of water Lajthiza is the indicator of strength. In general, natural mineral waters of our country have a low hardness, ranging from 6-11 German hardness grade, where the standard rate is 8-15 German hardness degrees. As such, they can be considered as water with low hardness. As such, they can be considered as water with low hardness. In the geological context, our waters are generally natural mineral water in the limestone cliffs descent, as it is the source of Lajthiza.So, in waters originating from limestone rocks and limestone-dolomite are rich in ion Ca^{+2}, $S0^{4-}$ while those with volcanic origins are rich in ion Mg^{+2} and $HC0_3^{-2}$.

5. If we refer to ions useful content and undesirable, we can say that the waters were analyzed content of F^- ions is desirable as desirable levels, while in terms of nitrate NO^{3-} mineral waters can be perceived as water "blue", quality first, where the nitrate content in values ranging from 0.5 - 4.9 mg / l (standards are $N0^{3-}$<10 mg / l).

6. The study conducted shows that in general there is an alignment between marketing indicators (label) and the packaged and fountain. Physico-chemical characteristics, microbiological and generally they are within standards.

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