Water Quality in Some Primary Schools in Shala e Bajgorës

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Abstract

In this scientific report are given some results of drinking water in some primary schools in Shala e Bajgorës. Samples which are analyzed are in region that is near mining Trepça in Mitrovica Municipality that are presented. Taking into consideration all important parameters we found they were within given limits , just temperature that is higher than given limits, so analysis of water samples for thermo tolerant faecal coli forms which are carried out by passing a measured quantity of water through sterile filter told us more than 60 % of samples were contaminated.

Therefore it was necessary to complete the procedure for chlorination of wells using Galisept.

On the base of physical – chemical and bacteriological parameters we may conclude that only after continual procedure of chlorination of wells it will be completed the conditions for drinking water in analyzed samples.

Keywords: Water, Physical and chemical properties, Presence of coli form bacteria

1. Introduction

Water is solvent of life; human body is about ¾ water by mass. More chemical and biochemical reactions take place in water than in other solvents combined. In absence of water, no known form of life is possible. The total amount of water on earth is estimated to be 1.4 x 10^9 km^3 of which 97. 4% is sea water and 2. 6 % is fresh water. Of the fresh water 4/5 is located in ice caps and glaciers and about 1/5 is relatively inaccessible ground water. Less than 1% of fresh water (0. 014 percent of total) is located in lakes, soils, rivers, biota and the atmosphere.

In Kosova about 70% of inhabitants live in villages (country side) and 60 % of them take drinking water from non hygienic shallow wells where distances WC – well is not adequate.

The supply of population with drinking water propound same request and criterion, starting with quality of water, construction and technology of cleaning, operation of preparing, overseeing supplying of reservoir. Therefore physical chemical and bacteriological parameters are necessity

The presence of same chemicals in drinking water is preferable because they give determined characteristics. Drinking water needs to be clean in bacteriological terms, to be clear, to have a nice taste without odorous and with temperature which gives water refreshment taste.

Refreshment properties and tasteful water is a result of present gaseous dissolved in water (O_2 and CO_2) and small amount of Ca $(HCO_3)_2$. The concentration of oxygen in water depends on temperature and partial pressure but also in level of pollution of water. The presence of reduction substances as ammonia NH_3, Fe (II), NO_2^- and other substances which oxidize very easy throw of this equilibrium by reducing the quantity of dissolvent oxygen this way. Concentration of dissolved oxygen is a parameter of impurity in water.

One of very important parameters about level of purity or impurity of water is chemical consumption of oxygen (oxidization) which presents quantity of reagent for oxidization of organic, inorganic or colloidal substances.

The production of decomposed organic substances, done by influence of special bacterium, gives to water unpleasant taste.

2. Experimental work

For investigation of quality of water in several schools in some villages in region Shala e Bajgorës that is near mining Trepça municipality of Mitrovica we take water samples in fields.

Some parameters as: odour, color, turbidity, temperature, pH, Chlorine, faecal coli forms were determined with "Portable Water Testing kit", while other parameters as specific conductivity, dissolved oxygen, oxygen saturation, spending of $KMnO_4$ dry remain, NO_2^-, Fe, Mn, etc. were determined in laboratory. The analysis of chlorine and pH has been done in comparator which is part.

The samples of water were taken by non sterile vacuum – cup (part of apparatus). The comparator cells were washed many times with water which is to be analyzed and finally filled with sample, than we droop DPD – 1 into the right – hand cell (Cl_2) hand a phenol red tablet into left – hand cell (pH). We replace the led of comparator and push down firmly to seal.

Then we invert the comparator repeatedly until the tablets have dissolved completely. Immediately we read the free chlorine residual and pH concentrations by holding comparator up day light and matching color developed in cell with standard color scale in the central part of the comparator. For testing total chlorine residual we don't discard the liquid in the comparator, but we do remove the lid and add a tablet DPD – 3.

Turbidity was determined in turbidity tubes cover the range 2 -5 TU. The turbidity tubes are graduated in logarithmic scale with the most critical values. The result is the value of the line nearest to the water level. In our cases the values were under level according to standards.

The analysis of water samples for thermo tolerant (faecal) coli forms is carried out by passing a measured quantity of water through a sterile filter. Any bacteria present in the water are caught in filter. The filter is then placed onto a paper pad soaked in liquid growth medium which feeds coli form bacteria, but inhibits any other bacteria caught in filter. To ensure that only thermo tolerant (faecal) coli form bacteria are allowed to grow, the filter is kept at 44^0 C in the kit's incubator until the bacteria multiply many times to form colonies of bacteria which can seen with naked eye. Thermo tolerant (faecal) coli forms are recognized by their ability to produce a color (from red to yellow) in the culture medium at 44^0 C. Results are expressed as colony forming units per 100 cm^3 of water.

Thermo tolerant (faecal) coli forms are of sanitary significance when present in drinking water supplies. Users should refer to country specific water quality standards or to World Health Organization (WHO).

Determination of electrical conductivity has been done using conduct meter WTN – D 812 Weilheim LBR 40, therefore determination of oxygen has been done by Winkler bottles. Nitrites were determined in a Helligen's comparator. Other parameters have been determined using standard methods.

3. Results and discussion

The experimental results of our investigation are present in table 1, 2 and 3. The temperature is very important factor for development of biological processes. Different organisms present in water, will adopt in given thermal conditions to grow their activity of vital importance. In different water supplies the results of temperature were different. Temperature in more cases was surplus value up 12^0 C which means that value was higher than standards.

Water which contains some organic substances (material) with plants and animal origin spends a quantity of $KMnO_4$ for their oxidation. Inorganic substances as NO_2^-, Fe (II), H_2S, etc. can oxidize with $KMnO_4$. Therefore spending of $KMnO_4$ will be taken into consideration as a measure for all present substances which are capable for oxidation. On the bases of spending $KMnO_4$ and taking into consideration standards we may conclude that investigation samples of water can be used as drinking water.

Turbidity of analyzed water every time was under the limits so we can say that this parameter doesn't have the influence on drinking water.

The investigation tells us that in most of analyzed samples there are present thermo tolerant (faecal) coli forms. On the bases of physical – chemical and bacteriological parameters given in tables 1 – 3, we can verify that in contaminated water supplies we need to do the process of chlorination continually to have criteria of drinking water.

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Table 1. Physical, chemical and bacteriological properties of water

Nr	*Parameter*	*Unit*	*Primary school in Rashan*	*Primary school in Mazhiq*	*Primary school in Maxhera*	*Detection limit*
1	Temperature	^{0} C	**17**	**14**	**15**	8-12
2	Odour	-		-	-	-
3	Colour	-		-	-	-
4	Turbidity	NTU	0,00	0,00	5,99	1.2-2.4
5	Sp. Conductivity	μcm^{-1}	794	564	4,02	Until 1500
6	pH	-	7,6	6,7	7,9	6,00-8,20
7	Spend. $KMnO_4$	mg/dm^3	1,26	2.212	6,11	Until 12
8	Residual Chlorine	mg/dm^3	-	-	-	0,2-0,5
9	Chloride	mg/dm^3	38	27	16	Until 200
10	Nitrite	mg/dm^3	0,011	0, 004	0,022	0.005
11	Nitrate	mg/dm^3	3,0	1,8	O,11	10
12	Iron	mg/dm^3	-	-	-	Until 0.30
13	Manganese	mg/dm^3	-	-	-	Until 0.05
14	Ammonia	mg/dm^3	0,06	0,04	0,00	0,1
15	Sulfate	mg/dm^3	39,1	52,86	9,34	200
16	Hardness of H_2O	^{0} dH	12,09	14,33	5,6	30
17	F. C. / 100 cm^3		**20**	-	**220**	-

Table 2. Physical, chemical and bacteriological properties of water

Nr	*Parameter*	*Unit*	*Public source in Kutllovc*	*Primary school in Kodër*	*Primary school in Melenicë*	*Detection limit*
1	Temperature	^{0} C	**14**	**16**	**13**	8-12
2	Odour	-	-	-	-	-
3	Colour	-	-	-	-	-
4	Turbidity	NTU	-	0,00	0,00	1.2-2.4
5	Sp. Conductivity	μcm^{-1}	637	804	272	Until 1500
6	pH	-	7,5	7,2	7,7	6,00-8,20
7	Spend. $KMnO_4$	mg/dm^3	4,09	3,43	8,47	Until 12
8	Residual Chlorine	mg/dm^3	-	-	-	0,2-0,5
9	Chloride	mg/dm^3	15	21,5	20	Until 200
10	Nitrite	mg/dm^3	0,004	0,015	0,05	0.005
11	Nitrate	mg/dm^3	0,7	3,7	2,4	10
12	Iron	mg/dm^3	-	-	0.01	Until 0.30
13	Manganese	mg/dm^3	-	-	-	Until 0.05
14	Ammonia	mg/dm^3	0,02	0,032	0,01	0,1
15	Sulfate	mg/dm^3	16,06	21,50	5,18	200
16	Hardness of H_2O	^{0} dH	15,68	9,63	5,6	30
17	F. C. / 100 cm^3		**10**	**4**	**220**	-

Table 3. Physical, chemical and bacteriological properties of water

Nr	***Parameter***	***Unit***	***Public source in Zjaçë***	***Primary school in Zhazhë***	***Public source in Boletin***	***Detection limit***
1	Temperature	^{0} C	**13**	6	8	8-12
2	Odour	-	-	-	-	-
3	Colour	-	-	-	-	-
4	Turbidity	NTU	0,00	0,00	0,00	1.2-2.4
5	Sp. Conductivity	μcm^{-1}	779	257	224	Until 1500
6	pH	-	7,6	3,9	7,6	6,00-8,20
7	Spend. $KMnO_4$	mg/dm^3	3,36	3,76	3,14	Until 12
8	Residual Chlorine	mg/dm^3	-	-	-	0,2-0,5
9	Chloride	mg/dm^3	43	250	17	Until 200
10	Nitrite	mg/dm^3	0,014	0,04	0,05	0.005
11	Nitrate	mg/dm^3	0,9	20,5	1,8	10
12	Iron	mg/dm^3	-	-	-	Until 0.30
13	Manganese	mg/dm^3	-	-	-	Until 0.05
14	Ammonia	mg/dm^3	0.00	0,01	0,00	0,1
15	Sulfate	mg/dm^3	26,62	-	-	200
16	Hardness of H_2O	^{0} dH	11,42	2,35	4,48	30
17	F. C. / 100 cm^3		**7**	**300**	**E. coli**	-

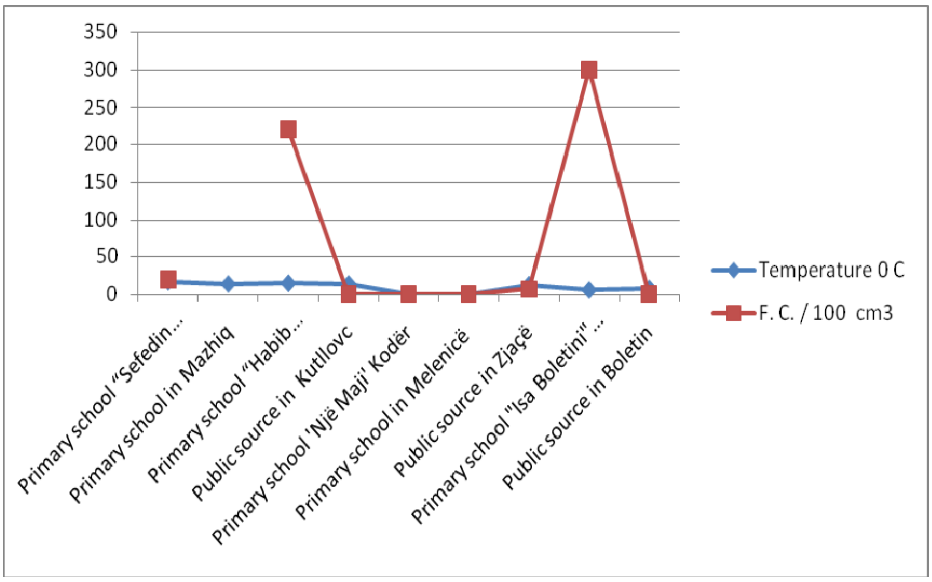

Figure 1. High value of Temperature and presence of Fecal Coli forms bacteria in samples