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STUDY ON THE CHEMICAL PROPERTIES OF GROUNDWATER ON THE DAMBOVITA COUNTY TERRITORY

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Abstract

The water is indispensable for life and the knowledge of actual chemical composition, the quantity and polluants types present, that may affect the proper development of organisms, is important.
This workpaper contribute to the creation of an image of overview of the current state of groundwater on the Dambovita County territory and aims to identify the cleanest, and the most polluted groundwater in Dambovita County.

Keywords: water, water pollution, safety, groundwater.

1. INTRODUCTION

In European Union emphasis is on conservation of the environment and biodiversity and on the relationship between the urban and the natural area, the sustainable development being on the first place.
In this way, there must be a detailed datebase with all the results regarding the environment influnces on the natural and anthropogenic ecosystems.
Because in Dambovita County are practiced different types of agriculture, sampling points were selected randomly to ensure a good coverage of the entire area studied and to lessen the likelihood of obtaining misleading results.
To be able to see current status of groundwater from Dambovita County and to be able to take the right decisions in combating water pollution in groundwater, must be taken water samples from aquifers and analyzed in specialized laboratories.

2. MATERIALS AND METHODS

Methods of sampling and analysis of water
The samples were taken from 12 sampling points, as follows: *Cobia, Comişani, Dumbrava, Finta, Găeşti, Gheboaia, Glodeni, Lucieni, Mărceşti, Picior de Munte, Târgovişte, Viişoara. (Foto 1*)
The samples were taken every 3 weeks, resulting 5 samples for every sampling point.

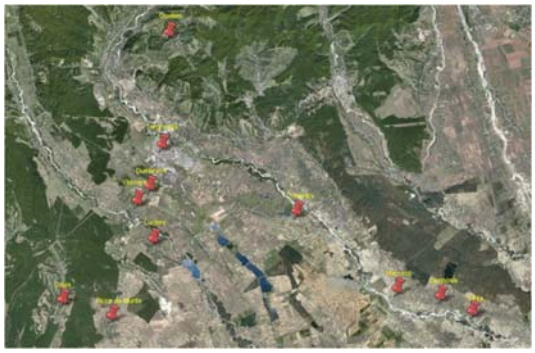

Fig.1. Samplig points (Sursa:GoogleEarth)

Were made chemical-physical determinations for water and sediments, were determined the filterable residue, total materials in suspension, according to standardized methods for determining specific for each sample separately.
Filterable residue determination from water
This procedure is intended to determine filterable residue from water at 105°C and is made according Standards no. 9187-84.
The reagents used must be that analytical quality or equivalent quality. Reagent preparation operations are carried out by the laboratory technician and are supervised (at random) by the person responsible for the bin.
The used reagents and consumables are:
Double distilled water – for reagents preparation and for making dilutions
Quantitative filter paper,
yellow stripe (medium) 10-15mm
Equipment and instruments used:
Analytical weighing scale – AX200 with a standard deviation ≤ 0,1mg - is used to weighing the necessary chemicals;
Water bath or sand;
Oven POL-EKO typ SLW 53 EKO;
Exicator;
Laboratory glassware which consists of:
- Recipients of 1000 ml;
- Erlenmeyer glass;
- funnels glass;
- volumetric pipettes of 10ml - 100ml;
- Crucible or porcelain capsules.

Samplinf of water
Sampling shall be carried out in containers of 1000 ml.
Prior to taking the samples of water, the laboratory glassware are normaly washing, after that are washing with double distilled water and with the analytical sample.
Filterable residue determination shall be carried out immediately or, if this is not possible, in a maximum

seven days after the sampling, the samples being stored at 3 – 4°C.

Preparation of capsules for analysis
The capsules are wash, dry 2 hours in the oven, pass in an exicator for 30 minutes and weigh

Way of working
The water sample is filtered using filter paper with low porosity, in a clean and dry Erlenmeyer. From being filtered are measured with the dropper one volume that is passed into a capsule brought in advance at constant mass. The sample is evaporated on the water or sand bath until dry.
The capsule containing the residue is drieing in an oven at 105 ° C for one hour, then pass in the exicator and weigh after 30 minutes.
The flatwork of drying, cooling and weighing repeats to constant mass, the difference between two successive weighings must not exceed 0.0005g.
The amount of filterable residue dry at 105° C is calculated as follows:

$$\left[R_{f\,la\,105^oC}\left(\frac{mg}{l}\right)\right]=\frac{(m_{c+r}-m_c)}{V_{sample}}\cdot 1000[mg/l] \quad (1)$$

where:
– $R_{f\,la\,105^oC}$ = filterable residue dry at 105 ° C, [mg/l];
- m_{c+r} = the weight of the dish with residue filtered at 105 ° C, [g];
- m_c = the weight without rezidue, [g];
- $Vsample$ = volume of sample, [l].

In the same time, have been determinate of **total suspended matter.**
This analysis is intended for determination of solid suspensions in wastewater by gravimetric method using the method described in SR EN 872:2005.
The reagents used must be of analytical quality or equivalent quality. Reagent preparation operations are carried out by the person who is going to perform the analysis.
Reagents and consumables used:
Suspension of reference, microcrystalline cellulose, 500 mg/ L
Weigh to 0,500 g quality of microcrystalline cellulose $(C_6H_{10}O_5)_n$ (dry in oven), for thin-layer chromatography (CSS), transfer quantitatively into a volumetric flask 1000 ml and make up to volume with distilled water up to the mark. Suspension shake well before use. This suspension may be preserved for at least three months.
Reference suspension, working, ρ=50 mg/L
Shake the suspension of reference to homogenization. Measuring the 100 ml ±1 ml n a volumetric flask of 100 ml. It is transfer quantitatively measured volume into a volumetric flask of 1000 ml and make up to volume with distilled water. Suspension shake well before use. The reagent is prepared daily.
Double distilate water
For preparation of solutions reagents and for making dilutions it will use double distile water brewed in the device made of glass or with the last condensation phase from glass, if you are not please specify other solvents.

Apparatus and instruments
Device for vacuum filtration
Device for filtering through membranes can also be used for other types of filters. The plate wich support the filter must have a suficient permeability to allow the water to pass freely.
Pump/Vacuum pump (Photo 2)
Filters from fiber of borosilicata glass

- should not contain no binder;
- must be circular and have a diameter adequate to fit the filter diameter (45-47 mm);
- must have a mass per unit area between 50 g/m^2 and 100 g/m^2;
- mass loss obtained in a trial witness must be less than or equal to 0,017 mg/cm^2.

Fig.2. Vacuum pump

Analytical weighing scale AX 200
Is used to designate the necessary chemicals, with a standard deviation ≤ 0,1mg and with a linearity of ±0,2 mg.
Oven POL-EKO typ SLW 53 EKO
Drying rack has material with adequate surface

Laboratory glassware

- sampling recipients of 750 ml, 1000 ml;

- volumetric flasks of 100ml, 250ml, 500ml, 1000 ml;
- Erlenmeyer glasses of 250ml;
- glass funnels;

Exicator

Sampling of water

Sampling shall be carried out in recipients (Erlenmayer glasses) of 750 ml or 1000 ml.Before the sampling of water, laboratory glassware is washed regularly, thanis washed with double distillate water and with the sample analysis.

Determination of the content of the materials in suspension is carried out within 24 hours of sampling.

Preparation for analysis filters

Are chosen fiberglass filters, a certain porazitate and prepare for analysis. Allow a couple of hours in distilled water, dry the filter in the oven at 105°C for 2 hours. Keep the filter for 30 minutes in a exicator and it weighs, avoiding contamination with dust filter.

Mode of work

Place the filter with the smooth side down, in funnel of filtration device, and the device connects to a vacuum line.

Shake the recipient that contains the sample and immediately transferred into a graduated cylinder, selecting the volume of the sample so that the dry residue to be in optimum. the sample is filtered, rinse the measuring cylinder with approximately 20 ml distillate water and this amount is used to wash the filter.

Stops the vacuum when the filter is almost dry (but no more than 1 minute from dripping water) and transfer the filter medium for drying. Dries 2 hours in oven, remove, keep the filter for 30 minutes in a exicator and weighs.

Calculation of results

Calculate the content of solids in suspension:

$$\left[MSS\left(\frac{mg}{L}\right)\right] = \frac{1000 \cdot \left(m_{f+s} - m_f\right)}{V_{sample}}[mg/l] \quad (2)$$

where:

– MSS = the content of solids in suspension, [mg/l];

– m_{f+s} = the weight of the filter with the suspensions after filtering, [g];

– m_f = the weight of the filter before filtering, [g];

– $Vsample$= volume of sample, [l].

3. RESULTS AND DISCUSSION

In the County of Dambovita, in the sampling points studied, average of **filterable residue** (mg/l) is presented in table 1.

By low, MAC (Maximum Allowable Concentration) for filterable residue is 2000 mg/l. Only one sampling point where there has been a large amount is at Glodeni. Due to the fact that all samples fall into this limit, not present risks of long-term population, if the water is consumed from these ground blades.

Table 1. Filterable residue (mg/l)

Nr	Sampling points	Average mg/l
1	Cobia	934,0
2	Comişani	358,0
3	Dumbrava	1.103,0
4	Finta	883,0
5	Găeşti	734,0
6	Gheboaia	1.342,0
7	Glodeni	1.880,0
8	Lucieni	630,0
9	Mărceşti	1.106,0
10	Picior de Munte	958,0
11	Târgovişte	342,0
12	Viişoara	941,0

It can be seen that the low recorded is in Targoviste with 342 mg/l, the maximum recorded being in Glodeni with 1880 mg/l. Water consumption, with higher concentration, can lead to kidney disease (kidney stone), but it does not pose a danger if water is used for irrigation, home use or for animal hydration. The results can be seen in the following figure 1.

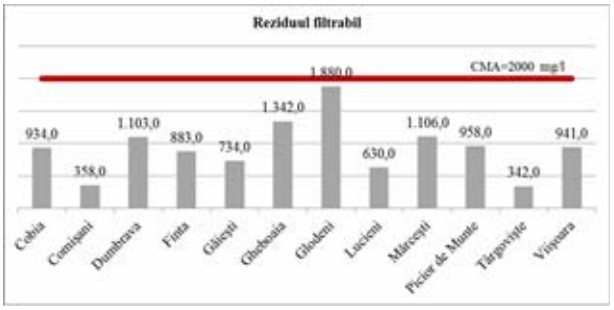

Fig.3. Filterable residue

The results **of solids in suspension** are found in table 2, here you can see the highest value recorded: Picior de Munte (4,4 mg/l), and the smallest value is in Mărceşti (0,6 mg/l). In conclusion, all the water samples are very clean water sources due to the very small recorded results.

Table 2 Total suspended matter

Nr	Sampling points	Average mg/l
1	Cobia	3,4
2	Comişani	1,0
3	Dumbrava	2,3
4	Finta	0,9
5	Găeşti	1,1
6	Gheboaia	1,0
7	Glodeni	2,6
8	Lucieni	0,8
9	Mărceşti	0,6
10	Picior de Munte	4,4
11	Târgovişte	0,8
12	Viişoara	1,7

The results can be seen from figure 2 depending of Maximum Allowable Concentration in force.

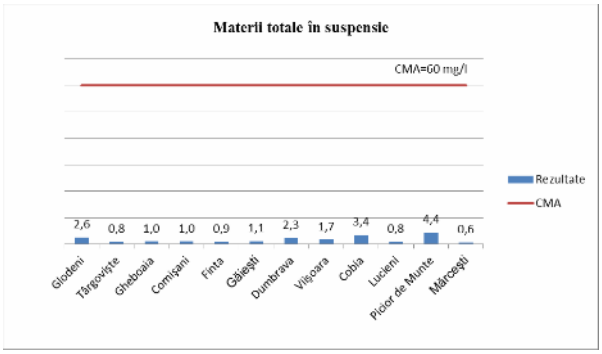

Fig.4. Total suspended matter

For the total materials in suspension, Maximum Allowable Concentration is 60 mg/l, because the highest value recording is 4,4 mg/l (in according with table 2). It is found that in the area of points where the water samples were taken, there are not dangers too high for water consumption. The results can be seen in figure 3.

4. CONCLUSIONS

From the graph we can deduce that the cleanest water for consumption is in Targoviste and in Comisani in terms of filterable residue.
Concerning data of solids in suspension, water can also be used by the general public for private consumption, household activities or for irrigation without causing problems with reference to the long-term consumption.

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