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Issue Article

Oleg Ivanovych Yurchenko
Kharkiv V.N. Karazin National University
PhD, Full Professor of Chemical Metrology Department,
yurchenko@karazin.ua

Tetyana Vasylivna Chernozhuk
Kharkiv V.N. Karazin National University
PhD, Associate Professor of Inorganic Chemistry Department,
tanya.chernozhuk@gmail.com

Oleksii Andriovych Kravchenko
Kharkiv V.N. Karazin National University
PhD, Associate Professor of Chemical Metrology Department,
alekseykravch@ukr.net

Alexandr Nikolaevych Baklanov
Kharkiv V.N. Karazin National University
PhD, Full Professor of Chemical Metrology Department,
baklanov_oleksandr@meta.ua

ECOLOGICAL AND TOXICOLOGICAL CHARACTERISTICS OF THE WATER OBJECTS AT KRASNOGRAD DISTRICS IN KHARKIV REGION

Abstract: *It was shown that surface and undeground sources in Krasnogradsky district, remoted from gas mines, are in good state. It was investigated 8 sources to determine toxity by biotesting method. It was determined big toxity in one object and middle toxity in two ones .According to the results of chemical analysis it was established that source No 3contains excess of sulphates,total hardness of water and alkalinity,Ca, Mg and dry ppt. It was proved that this water does not corresponds to DSan Pin 2.24-171-10 and cannot be used for everyday use .It was established that water from Oktabrske source may be used as curable with mineralization 1,0-3,0 g/ml. Water from Khomutovski park has exsess of nitrates in 1,2 times. It was shown that water from sourses compare with plumbing water is colourless, withot taste and smell. Plumbing water is with chlorine smell, unpleasant taste but corresponds to standards of drinking water.*

Key words: *surface and spring water, chemical analysis, toxity biotesting, PDK.*
Language: *English*
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Introduction

Krasnograd district lies within the Dnieper lowland. Its relief was created under the action of pouring water. Its surface is wavy plain, divided by river valleys, multiple streams and ravines. It is the part of the Kharkiv Dnipro-Donetsk watershed plateau, on southeast of the Poltava accumulation of the forest fragmented plain, to the west from the Dnipro-Siversky Donets watershed, which lies within the borders of Prydniprovska left bank lowland. The

highest point is 200 m above sea level, the lowest is 85–105 m. River valleys and gullies are the main landforms of Krasnograd district. However, the density of the beam dismemberment, depth and shape of beams is significantly facilitated within different limits of geomorphological levels. The most complex and saturated character in outbuildings of the district are owned by the influence of the Orchyk and Berestova rivers. The territory of the district is dominated by long, tree-like beams. Thus, the surface district has a general slope from northeast to west. The water sources of the district, both surface and underground, unfortunately, constantly exposed to anthropogenic pollution, such as fall during the development of gas condensate fields (infiltration into water, chemical reagents, oil, fuel and lubricants and rare products of gushing wells); impact from activity of agricultural objects. The city of Krasnograd is provided with drinking water, which has artesian water origin. Water from artesian wells enters the reservoirs, and then it is supplied to the station for lifting, and from it to the consumer. In connection with the extremely poor condition of the water supply networks, water often reaches the consumer with a high content of impurities. Therefore, it is recommended to the population install individual cleaning devices. The method of disinfection is chlorination is carried out using a mobile chlorate installation. The object of the research is the surface and underground waters of Krasnograd district of Kharkiv region.

The subject of the study is the quality of groundwater in Krasnograd district. The purpose of this work was to determine the ecological state of spring water of Krasnograd district of Kharkiv region to complete the general catalog of studied sources using chemical analysis and method biotesting. In the course of the analysis, a classification was established by the level of water toxicity and degree of contamination. Environmental toxicity can be created even when pollutants are present in acceptable concentrations. Biotesting is a procedure for determining the toxicity of individual chemicals substances, surface fresh, sea and brackish, underground and wastewater to assess changes in vital functions or detect lethal effects on test objects (hydrobionts). The experiment included a series of repetitions with different dilutions of the test substance, and the control - the same test organisms in pure water or in a medium for cultivating hydrobionts. The biotesting method was used in combination with chemical ones research methods, because the chemical composition cannot be evaluated toxicity of substances and how they affect organisms. Biotesting gives direct results results about the degree of danger of the environment under investigation.

According to the biotesting method, it was found that in source No. 1 p. Dobrenka and V source No. 3. In source No. 1 p. Berestovenki, the highest quality water. Water toxicity is not manifested in the spring well of Orchyk village. Petrovka, v source No. 7 p. Berezovka, in source No. 2.1 p. Pischanka, in source No. 2.2 p. Chickweed. [1,p.24;2,p.16;3,p.11;4, p.20;5,p50;6,p.39;7,p.52;8,p.38;9,p.48;10,p.85;11, p.77;12,p.9;13,p.51;14,p.75;15,p.83]

Experimental part

In order to study the ecological state of water sources in Krasnograd district and determination of water quality by the method of biotesting on crustaceans (Ceriodaphnia affinis Lilljeborg) as the most sensitive object to wide spectrum of chemicals and for use in water protection practice according to carrying out toxicological assessment, control of surface and drinking water samples were taken from 8 sources of the district. The toxicity of water is manifested in the spring of Khomutovsky Park city of Krasnohrad and source No. 3. village of Berestovenka in accordance with the protocols. The pollution of these sources is influenced by a large number of factors, according to our observations, the toxicity of the Khomutovsky Park source (the city of Krasnohrad) are affected by the following factors: a large number of motor vehicles (a car park nearby) and the leaching of mineral fertilizers (there are agricultural lands around) and household waste (a landfill nearby). On the toxicity of water from the source of the village. Birches can be affected by: railway, domestic and industrial waste. For chemical analysis, water samples were taken from three sources in the study area and a water sample from a local water supply. In 2014–2015, the quality of the sampled water was assessed according to DSanPiN 2.2.4-171-10 according to organoleptic, physicochemical, and sanitary-toxicological parameters. Water samples were checked for the content of calcium, magnesium, dry residue, total hardness, total alkalinity, metal compounds and other indicators. When comparing the results of the analysis of water samples from the sources of the village. Berestovenka, with. Oktyabrske and sources in Khomutovsky Park, which were carried out on 17.10.2019, 11/19/2020 and 11/05/21 in the educational research laboratory of analytical of environmental studies of Kharkiv V.N. Karazin National University can draw the following conclusions:

- conducted a study of sanitary and chemical indicators of safety and in the quality of spring water for two years established an insignificant difference ranging from 10 to 15 percent) by all defined indicators, which is quite natural;

- the analysis of organoleptic indicators did not establish exceedances of MPC, however, the taste and aftertaste indicators characterize the studied water as salty and bitter-salty;

Laboratory analysis of the chemical composition of three sources in Krasnohrad found that all sources exceeded the MPC of sulfates, total hardness, total

alkalinity, calcium, magnesium and dry residue. Such water according to DSanPiN 2.2.4-171-10 does not meet the indicators of physiological adequacy and cannot be used for everyday consumption;

- research of sanitary and toxicological parameters in spring water determined an excess of content in the water of Khomutovsky Park in the city of Krasnograd nitrates by 1.2 times, which makes this water dangerous for humans; tap water meets standards for drinking water according to DSanPiN2.2.4-171-10.

Conducting observations on the state of spring water for several years, including visual observations and description of water bodies, as well as establishment of qualitative and quantitative indicators of the chemical composition of water, replenishing the data of the catalog of sources of the Krasnograd district - was the main one task of the conducted monitoring. This made it possible to assess the ecological condition sources, determine possible ways of contamination with further reduction or complete elimination of their impact on the state of water ecosystems. A comparison of the content of the studied components is shown in Table 1, according to which it can be said that both by organoleptic and by sanitary-chemical indicators of the safety and quality of spring water there is a significant excess of indicators in source No. 3 p. Berestovenka and Khomutovsky Park in Krasnohrad, research was carried out during2014–2015, 2017. According to the results of the monitoring of the condition of the 3 sources, a significant amount was established exceeding indicators: total hardness by 2.2 times, dry residue by 1.38 times.

Conclusions

There are 16 registered in Krasnograd district sources that differ significantly in the content of chemical substance.

1. Surface and underground sources that are distant from development gas condensate deposits are in a relatively satisfactory condition, however, sources of drinking water need improvement and constant monitoring water by biotesting and chemical methods.

2. 8 sources were tested for toxicity by biotesting, in one acute toxicity was detected from them, chronic toxicity was detected at two objects toxicity (the village of Berestovenki and the spring of Khomutovsky Park).

3. A chemical analysis of three sources was made: source No. 3 p. Berestovenki, Khomutovsky Park, the results of which showed an excess of MPC in terms of content sulfates, total hardness, total alkalinity, calcium, magnesium and dry matter the remainder.

4. Water springs from the village. Oktyabrske, can be attributed to the medical canteen, a namely, brackish with 1–25‰ mineralization or slightly saline with mineralization1.0–3.0 g/dm³, and use as a refreshing drink or in medical preventive purposes.

5. Water from the spring of Khomutovsky Park Krasnograd has an excess1.2 times the nitrate content, which makes this water dangerous for humans.

6. Water from springs is transparent, colorless, without smell and taste, softer, pleasant to the taste.

7. The water from the tap has a chlorine smell and is unpleasant to the taste, but it responds standards for drinking water according to DSanPiN 2.2.4-171-10.

8. Based on the results of the analysis, recommendations were made regarding prevention of pollution of water bodies, in particular, to observe technological mode during exploitation of oil and gas fields.

9. Sources whose water is suitable for drinking need improvement and constant control.

Table 1. The results of testing of water sources at Krasnograd districs in Kharkiv region.

№	Name of the object	Number of alive cereodafnias	Middle value		Standard deviation		Students criteria		Conclusions	
1.	Source№1, at Berestovenky	3	6	6.33	0.58	1.53	1.34	0.72	Untoxic	Untoxic
2.	Source№2, at Berestovenky	1	0.2	7.0	0.33	0,00	3.10	0,00	Toxic	Toxic
3.	Source№3, at Berestovenky	5	1	9.50	0.75	2.51	0.10	0.16	Untoxic	Untoxic

4.	Source№1, at Dobrenky	3	0.6	4.00	0.58	1.00	1.34	1.82	Untoxic	Untoxic
5.	Source№1, at Pishanky	5	1	4.00	0.75	1.22	0.10	0.78	Untoxic	Untoxic
6.	Source№2, at Pishanky	5	1	9.80	0.75	1.64	0.10	0.53	Untoxic	Untoxic
7.	Source at Orcyk	2	0.4	6.50	0.47	0.71	2.15	2.32	Untoxic	Untoxic
8.	Source at Krasnograd	1	0.2	7.00	0.33	0,00	3.10	0,00	Toxic	Toxic

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