DRINKING WATER QUALITY ASSESSMENT IN BOLSHIE OZERKI

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Ключевые слова. Питьевая вода, качество, обезжелезивание, фотометрическое определение, экспресс-определение, норматив.

Keywords. Drinking water, quality, deferrization, photometric determination, express determination, standard.

The quality of drinking water in the Republic of Belarus is assessed based on microbiological indicators, chemical composition and organoleptic properties. In the Republic there is a problem of high iron content in groundwater, which is the main source of water supply. In accordance with established standards, the maximum permissible concentration of iron in drinking water is 0.3 mg/dm^3 [1]. Exceeding this indicator can lead to the appearance of odor, color and turbidity in the water, as well as negatively affect the epidemiological safety and hygienic reliability of water supply systems. Iron in water can be present in various forms. It can be dissolved ferrous iron, insoluble ferric iron, colloidal iron, organic and bacterial iron. The choice of the type of installation for water deferrization depends on its form in the water. Many settlements operate installations for deferrization of water supplied to the population.

The purpose of the work is to assess the quality of drinking water in the agricultural town Bolshie Ozerki for sources of centralized and decentralized water supply by iron content.

To achieve this goal, the following tasks were solved:

– samples of drinking water were taken from wells and from the water supply system;

– the content of total iron in the selected samples was established;

– the content of total iron in tap water at different times of the day was determined;

– the obtained results were compared with sanitary and hygienic standards.

Material and methods. Water sampling was carried out in accordance with TKP 17.13-14-2021, GOST 31861-2012 [2; 3]. Plastic containers were used to take water samples. Sampling containers should be thoroughly washed to minimize possible contamination. The container was rinsed three times with the test water immediately before collecting water.

Determination of total iron in water samples was carried out using the NILPA test (express method) and the photometric method with sulfosalicylic acid.

Results and their discussion. The results of determining total iron in the water samples are presented in Table.

Table – Concentration of total iron in the water samples

№	Sampling location	Iron concentration, mg/dm^3	
		photocolorimetric determination	test NILPA
1	2	3	4
1	residential well	0,29	0,3
2		0,16	below detection limit
3		0,04	
4	residential well	0,05	below detection limit
5		0,11	
6	plumbing residential buildings	0,16	0,2
7		0,17	0,2
8		0,15	0,1
9		0,12	0,1
10	school plumbing	0,15	0,2
11	water tower	0,36	0,3
12	dining room plumbing	0,14	0,1

As follows from the data in Table, only one water sample exceeds the standard for iron by 1.2 times. In one water sample taken from a well in a residential building, the concentration of total iron is close to the MPC = 0.3 mg/dm^3 (0.97 MPC). In six of the samples, taken both from a well and from a water supply system, the concentration of the component being determined is about half the MPC.

If you compare the results of photometric and express determinations, you can note the correlation between the obtained values. A higher concentration in the photometric determination corresponds to a higher concentration in the express method, and vice versa. However, the concentration values after measurement with the NILPA test kit are very approximate and require clarification. Its use is acceptable for approximate determination of iron concentrations at high contents, because the test works with an accuracy acceptable in everyday conditions.

Of interest was the study of changes in the concentration of iron in tap water during the day. To do this, water samples were taken at different times of the day and the concentration of total iron was determined. The dependence of the concentration of iron in tap water on the time of day has been established. Maximum values are reached early in the morning (5 a.m.) and late in the evening (9 p.m.). This is explained by the fact that iron enters drinking water not only from underground natural sources, but also from the water supply networks themselves in case of significant wear and corrosion.

Conclusion. Based on the results of the drinking water quality studies we can say that no significant excesses of the standard values of iron concentration were identified. Most samples contain iron in concentrations of about half the MPC. The use of rapid tests for the household determination of iron in water is justified at high concentrations of the pollutant, but laboratory tests are necessary to establish the exact concentrations. The concentration of iron in water is significantly related to the time of day, which confirms the influence of the condition of water supply networks on the quality of drinking water.

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НАУКИ О ЗЕМЛЕ

СОСТАВ, СТРОЕНИЕ И СВОЙСТВА БАЗАЛЬТОВ КАНЬОНА РЕКИ АКАКИ (КИПР)

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Keywords. Engineering geology, soil science, basalts, rock properties, Cyprus.

Изучение базальтов как скального грунта имеет важное значение для инженерной геологии [1–3], поскольку базальты являются наиболее распространёнными магматическими горными породами, и понимание их свойств и корреляции их с составом и строе-