

# Scientists described how to quickly extract "dangerous" selenium from water

Selenium is considered to be a vital trace element, it is found in many living organisms, in particular, in humans, where its proportion is about 20 mg. Depending on the forms of occurrence and concentration in natural objects, selenium being a nonmetal named after the Moon (from Greek Selene) has a dual effect on living organisms and human health.



On the one hand, selenium is a part of work of the immune and antioxidant systems of the body, it is armed with anti-inflammatory activity, and it's a part of many hormones and enzymes, and also stimulates metabolic processes. On the other hand, the regular use of drinking water with a high content of selenium or products containing toxic forms of selenium, increases the risks of cardiovascular diseases, endocrine and neurological disorders occur, irritancy and rapid fatigue haunt a person and liver functions are impaired.

*„Selenium comes from nuts, groats, meat, mushrooms, seafood, it is very important for our health. However, selenium can be found in both organic and inorganic forms in water, while the latter are more toxic to the human body: they include selenate (selenium in oxidation state +4) and selenite (selenium in oxidation state +6). Their quantitative ratio in the natural aquatic environment depends on many factors: the composition of water, surface or groundwater, oxygen saturation, pH. Selenium compounds in oxidation state +4 have the greatest toxic effect due to its higher solubility in water and accessibility to living organisms. Therefore, the determination of various forms of selenium in drinking water is so important,“* said **Svetlana Didukh-Shadrina**, co-author of the study, associate professor of the Department of Physical and Inorganic Chemistry, researcher at the SibFU Research Department.



The scientists have proposed a new simple way to detect toxic forms of selenium (in oxidation state +6 and +4) in water. To do this, a system was used that was developed and tested earlier at the university for the separation and determination of arsenic forms in water.

The system consists of two sequentially connected special cartridges, which are filled with sorbents obtained in the laboratory of SibFU's Kristall Research Engineering Center. During the passage of water through the system, selenium(+4) is extracted in the first cartridge, then water enters the second cartridge, where selenium(+6) is adsorbed in its turn. The cartridges are sent to a chemical laboratory after that, where the researchers analyze the content of each form of selenium.

*„Obtaining such highly-selective to the extracted forms of selenium sorbents is practically justified — this method will help control the quality of drinking water in places where there is a risk of increased selenium content,“* the scientists said.

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[Abstract](#)

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