

Polytech scientists found an alternative to water chlorination



Scientists developed a unique equipment for complex water purification which can improve or in some cases replace the process of disinfection with chlorine. Specialists of Peter the Great St. Petersburg Polytechnic University (SPbPU), participant of the Project 5-100, developed a unique equipment for complex water purification which can improve or in some cases replace the process of disinfection with chlorine.

The developed equipment is an electrolysis unit producing an innovative reagent of sodium ferrate. Ani Petkova, chief researcher of the Laboratory "Mechatronics" of SPbPU, explained that sodium ferrate is capable of decomposing many toxic chemicals into low-toxic products, as well as destroying microorganisms, providing the disinfectant effect.

According to the researchers of Polytechnic University, unlike chlorine, forming harmful residual organochlorine compounds, the new reagent does not form toxic substances in the process of water purification.

Scientists believe that the use of the developed equipment will significantly reduce the cost of the water treatment process. "To disinfect 1 liter of drinking water in summer, only 0.5 gram of sodium ferrate is required instead of 4.5 gram of chlorine. In the cold season, 0.2 gram of ferrate will be needed instead of 2 gram of chlorine," calculated Ani Petkova. She added that the necessary dose of reagent is reduced approximately to 10 times.

Scientist mentioned the developed equipment can be used both for the drinking water preparation and for disinfection of industrial and domestic wastewater.



This is one of the most actual area of ferrate usage due to the requirement of chlorine absence in most wastewaters. "The water drained into natural water reservoirs can't be treated with chlorine, as it has a long-term effect and forms toxic compounds while interacting with organic matter in rivers and water reservoirs. There is no such problem with ferrate, as it reacts quickly and decomposes to non-toxic products, which allows draining the treated water into natural water reservoirs," Ani Petkova noted. Tests conducted by SPbPU scientists also demonstrated that ferrate can neutralize chlorine in the water, which was already purified.

Moreover, specialists of Polytechnic University conducted the tests at the landfill of hazardous wastes "Krasny Bor" (Leningrad region) . The results showed that sodium ferrate is able to cope with serious contaminants such as oil products and their derivatives, nitrogen, phosphorus, sulfur-containing substances, cyanides, ammonia, heavy metals and other pollutants in industrial wastewater and reservoirs.

Scientists believe that the equipment can be useful for the countries with a developed sewage system, as well as regions requiring local treatment of drinking and wastewater. "It seems that China may be interested in such development. Chinese experts are actively engaged in research of disinfecting properties of sodium ferrate," said Ani Petkova. "The reason is periodic unpleasant odor in the coastal areas, where salt water is actively used for domestic purposes. It enters the drains and causes the release of sulfur-containing substances. The use of sodium ferrate can possibly solve this problem," the scientist added.

She also noted that the reagent can be useful in emergency situations. "In such cases, when certain groups of the population temporarily have no source of drinking water, and water from natural sources should be previously disinfected. For such situations, a mobile unit can be developed that produces a ferrate at the site where this group of people is located," the researcher added.

Polytechnic University is a participant in the Academic Excellence Project (Project 5-100). Within the framework of Project 5-100, multidisciplinary polytechnical knowledge is created, science-intensive and advanced production technologies at the world level. The University actively develops conceptual solutions for the organization of business processes of the entire life cycle of the product in modern industries, radically increasing the efficiency of design and manufacturing of customized products.

