Krasnoyarsk researchers about making wastewater drinkable

A water purification plant is to be set up in Krasnoyarsk. It would serve to make wastewater drinkable.

Our world suffers from a deficiency of clean drinking water. We lack freshwater, as only 2.5 % of all water on Earth is drinkable, and we can easily reach only 0.3 % of this amount. Turning technical and polluted water into drinkable is one of the most urgent objectives of modern science. The innovative project supervised by Prof Lyudmila Kulagina, Cand. Sc. in Engineering, assistant professor at Technosphere and Environmental Safety Department, Siberian Federal University, is aimed at solving it.

The project is supported by the Krasnoyarsk Regional Science Foundation and the Russian Foundation for Basic Research, which allowed the researchers to work on the problem of treating natural and wastewater to meet the public need for drinking water, taking into account environmental protection.

The water is purified with a cavitator, a device similar to a household blender with rotating blades. During the water treatment process, fields of high pressures and temperatures are formed around the blades, which generate waves of compression and rarefaction, and it causes the collapse (explosion) of cavitation bubbles. As a result, we achieve water disinfection, destruction of microbes and bacteria, i.e., biological purification. This process is called cavitation treatment.

The cavitation process is not innovative, as it has been developing in Russia since the 1970s. Nowadays, there are cavitation installations in Russian laboratories, including one at the Polytechnic School of Siberian Federal University.

Supercavitation is a processing mode in which the risk of surface erosion (metal fatigue) of the blade systems is minimized, which increases the service life of the installation. This phenomenon underlies the research of Prof Kulagina's project.

> *'Cavitation is one of the stages in the chain of purification and deriving of drinking water. The whole technological process takes multiple stages and goes as follows: sand trap (coarse cleaning), filters (finer mechanical cleaning), supercavitation process (biological treatment)',* adds **Lyudmila Kulagina**.

In theory, we can purify wastewaters and consume them again endlessly. What is more, there are no emissions in purifying the water this way, so the environmental burden is minimized. No harmful-to-nature compounds are formed. Also, the supercavitation process is resource-saving and doesn't require reagents. Recycling the water reduces the load on rivers, lakes, streams, etc. as no liquid is taken from there.

Aside from the theory, the research has a practical aspect involving rotary-type cavitation. This will allow us to identify the optimal operating modes of the evaporator, as well as to develop a unique apparatus. Moreover, cleaning equipment is in great demand among large industrial enterprises.

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