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PORTABLE INSTALLATION FOR TESTING FILTER MATERIALS AND TECHNOLOGIES FOR POTABILIZATION OF NATURAL WATERS

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Introduction

The provision of safe water to the rural population of the Republic of Moldova is a pressing issue. Scientific research conducted in recent years at the Institute of Chemistry of USM, focusing on groundwater quality, highlights that only 6% of water from artesian wells and 5% from phreatic wells meet the sanitary standards imposed by the "Drinking Water" national quality standards. In water samples taken from artesian wells, the chemical indices that exceed the maximum allowable concentration (MAC) levels are as follows: hardness, ammonia and ammonium ions, hydrogen sulphide and soluble sulphides, as well as the content of sodium and iron ions. In water samples taken from phreatic wells, the chemical indices that exceed the MAC levels are as follows: total hardness, nitrate ion content, and dry residue. The issue of providing the rural population with quality drinking water can be solved by developing innovative groundwater potabilization technologies. To address this problem more quickly and efficiently, a portable pilot station for natural water potabilization has been constructed in the Ecological Chemistry Laboratory of the Institute of Chemistry of USM.

Materials and methods

The schematic of the installation is presented in the following Figure 1. The semi-pilot installation has the advantage of being portable, operating autonomously, allowing simultaneous testing of large-scale potabilization technologies under dynamic conditions. It is possible to combine multiple water treatment processes and change their sequence. It also allows testing of loads for filter columns (carbon and mineral adsorbents, filter and catalytic materials, ion exchangers, etc.), both commercial and laboratory-made, and offers the possibility of real-time monitoring of water parameters after each treatment stage. Since the installation includes most of the water treatment processes applied on a large scale, it allows for the development of efficient potabilization technologies in the shortest possible time. The flow rate can be adjusted within the limits of 0-600 ml/min, depending on the water parameters and the filling of the columns. Depending on the pollutants present in water, the treatment methods can be combined: oxidation to remove reducing agents (sulphides, ammonium ions, organic substances, etc.), ion exchange to reduce water hardness, adsorption to remove hard-to-oxidize organic substances (phenols, dyes and persistent pesticides etc.) and reverse osmosis for the elimination of fluoride and sodium ions.

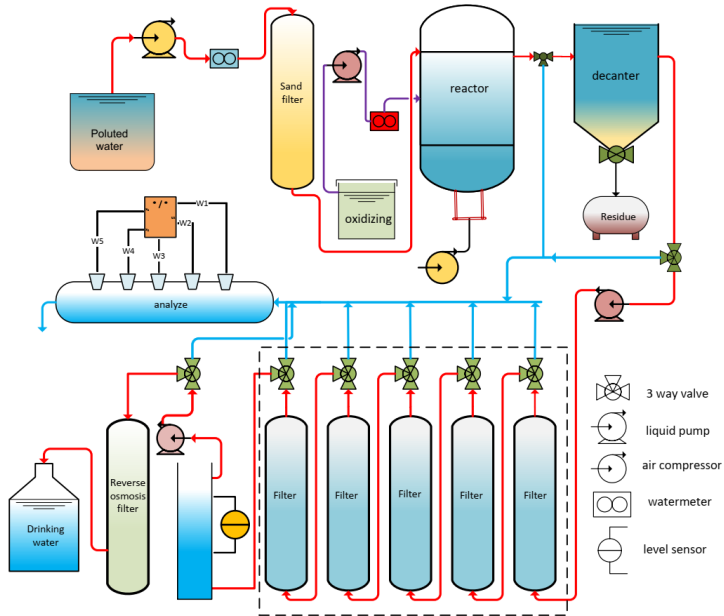


Figure 1. Block diagram of the portable installation for testing natural water potabilization technologies under dynamic conditions.

Results and conclusions

The innovative semi-pilot installation offers several advantages: it is portable, it works autonomously, it allows the simultaneous testing in dynamic conditions of water treatment technologies used on a large scale, it gives the possibility to combine several water treatment processes and change their consecutiveness, it allows testing the loads for the columns filters (carbonic and mineral adsorbents, filter and catalytic materials, ion exchangers, etc.) both commercial ones and those obtained in the laboratory. It also gives the possibility of monitoring the water parameters in real mode after each stage of treatment, which is of interest to young specialists that study water purification processes as demonstration equipment.

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