

UNDERGROUND WATER POTABILIZATION USING PHYSICAL, PHYSICO-CHEMICAL AND CHEMICAL PROCESSES

Oleg PETUHOV, Tatiana MITINA, Nadejda BONDARENCO, Diana GRIGORAS, Tudor LUPASCU
Institute of Chemistry of MER, Republic of Moldova

Corresponding author: Tudor Lupascu, e-mail: lupascut@gmail.com

Keywords: *underground waters quality, potabilization processes.*

Introduction. In the last 70 years, as a result of the intensive development of industry, agriculture and the living standards of the population on Earth, the water quality has deteriorated catastrophically. This endangers the health of the population, causing the spread of infections and the appearance of chronic diseases. The study carried out by researchers from the Water Chemistry Laboratory of the Institute of Chemistry over the last 25 years, aimed at the establishing of the chemical indices of natural water quality showed that in most cases, water from underground wells does not comply with the required sanitary norms of the "Drinkable Water" STAS. Scientific research has been carried out using physical, chemical and physico-chemical processes such as aeration, oxidation, ion exchange, adsorption on activated carbon, and reverse osmosis.

Material and methods. The water samples of the underground wells from different geographical areas of the Republic of Moldova were taken in plastic bottles, of which three 1-litre bottles were completely filled and transported to the laboratory in refrigerated boxes for a maximum of 5 hours for being analyzed.

The concentration of hydrogen sulfide and soluble sulfides, ammonia and ammonium ions, nitrite ions, nitrates, chlorine, fluorine, sulphates, iron, manganese, calcium, magnesium, and permanganate oxidability was determined using the analytical methods and standardized spectrometry. The removal of chemical components that exceeded the maximum allowable concentration (MAC) in drinkable water was performed using the unique pilot plant developed and built at the Laboratory of Ecological Chemistry of the Institute of Chemistry. The research leading to these results has received funding from Innovation Staff Exchange Programme and institutional project DISTOX, no. 20.80009.7007.21

Results. The analysis of chemical water quality indices retrieved from 115 artesian wells from different geographical areas of the Republic of Moldova revealed that the most frequent MAC values exceeding these indices are the values of ammonia concentrations and ammonium ions, hydrogen sulfide and soluble sulfur, sodium ions, iron, manganese nitrites, nitrates, as well as the oxidability of the permanganate. It has been established that out of the 115 artisanal wells under study, 96% do not fully comply with the quality indices required for drinkable water. Water taken from underground wells, showing chemical quality standards exceeding MAC has been treated under dynamic conditions using the following consecutive processes: mechanical filtration, aeration, oxidation, ion exchange, adsorption on activated carbons.

Conclusions. The underground waters from the Republic of Moldova are of poor quality. Using consecutive processes of filtration, aeration, oxidation, ion exchange, adsorption on activated carbons, reverse osmosis, water with drinkable qualities can be obtained.