

ANALYSIS OF GROUNDWATER SOFTENING METHODS

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Abstract. In order to increase the demand for water for the population and industrial enterprises and to solve this problem, in order to efficiently use groundwater, protect them from any pollution and compare methods used to date to soften hard water. To soften the groundwater, we offer a method of softening hard water using modern devices and filters created not only by our state, but also by foreign scientists. Such devices and filters differ from other types of hard water softening methods in their compactness and convenience and have many advantages.

Keywords: hardness, calcium and magnesium carbonate, ions, sheep, dispersity, micropufak, ammonium hydroxide

Currently, great importance is attached to providing the population and all sectors of the national economy with clean drinking water in sufficient quantity and quality, and this is considered as one of the important issues. In a number of regions of our republic, underground water reserves are mainly used for drinking water supply. These waters become unfit for drinking as a result of natural formation or addition of wastewater from various industries. In many cases, the amount of dissolved salts in water exceeds the required level, mainly consisting of calcium and magnesium carbonate salts, which give hardness. However, these salts create hardness in the water and make it unsuitable for drinking, steam rooms and energy use. Water hardness is a common problem for water supply, industrial enterprises and central heating systems. This problem is mainly felt when underground and underground water is used for domestic drinking water supply. For example, when groundwater is used mainly for water supply, it is characterized by hardness due to the presence of 70-80% mineral compounds, hydrocarbonate calcium. Calcium and magnesium ions, which give water hardness, form poorly soluble compounds on the surface of heat exchangers, heat-electric devices, and pipes, which means that their efficiency decreases sharply, fuel consumption increases, and they have to be stopped quickly to clean them from deposits. is correct. The use of such groundwater for drinking and technical purposes requires the combined use of water softening and water treatment. The following methods are used to reduce water hardness: thermal, reagent, ion exchange, membrane, magnetic treatment and generalized methods of various departments. Even the listed methods, despite their widespread use, have a number of disadvantages due to the complexity of initial water preparation, waste water treatment and their disposal, as well as the large consumption of reagents. The currently listed shortcoming leads to

the question of searching for new technologies to accelerate the process of reducing water hardness. Currently, a generalized technology of water preparation combining physical and "perfect" process is being developed. It is known that a promising method of accelerating technological processes involves increasing the dispersion level of the interaction between the contact phase system and the surface. It can be used for this purpose, the solution of the problem includes the organization of microbubble gas liquids [1, 2]. In the chemical, metallurgical, food and microbiological industries, microbubble gas-liquid environment is used to speed up the technological process. However, there are currently no water softening methods based on the use of microbubble gas-liquid media. Also, the influence of ammonium hydroxide in the process of precipitation of calcium carbonate in the case of formation of microbubble gas-liquid environments has not been sufficiently studied. Therefore, it is urgent to develop a method of removing calcium hydrocarbonate from underground water using microbubble treatment and ammonium hydroxide. The purpose of using a microbubble treatment generator and ammonium hydroxide is to develop the processes of removing calcium hydrocarbonate from underground water and the hardware-technological images for its implementation. To achieve the set goal, the following issues are solved and formulated: thermodynamics is calculated and indicators of the processed process are determined; changes in the physical and chemical parameters of the investigated aqueous solutions (hydrogen index, specific electrical conductivity, the amount of conventional salts, the percentage of calcium ions and total hardness) are determined; the stage of the hydrocarbon removal process is determined; study of the phase composition of calcium carbonate formed as a result of water treatment using ammonium hydroxide; development of a hydrodynamic generator calculation method used to create microbubble gas-liquid environments; development of hardware-technological image of removal of calcium hydrocarbonate from underground waters; The scientific innovation of microbubble gas-liquid environments is summarized as follows: in the formation of microbubble gas-liquid environments, due to the transition of dissolved carbon dioxide to the gas phase, it was determined that the hydrogen index (pH) increases to the value of 8,05 \pm 0,02, that is, the balance of carbon dioxide towards the side of decomposition of hydrocarbonate ions and formation of carbonate ions facilitates movement; with the average composition of groundwater, the percentage of calcium ions in the model solution was determined to decrease from 84,16 to 4,68 3 mg / dm (by 92%) in the amount of 0.01% of ammonium hydroxide. The final share of calcium ions does not depend on the initial share, but is determined only by the value of the hydrogen index (pH) of the model solution; It was determined that the interaction between ammonium hydroxide and calcium hydrocarbonate moves to the transition zone ($E_a = 26,4$ kDj / mol), that is, the share of ammonium hydroxide in the acceleration of the given reaction and the formation of microbubble gas-liquid

environments is also at the same time affects. The rate of the reaction constant for the formation of calcium carbonate at a temperature of 15 °C is 0,019 (-1 s), the order of the reaction is 0,48. Thus, we propose the use of microbubble generators and ammonium bicarbonate in the softening of underground hard water, and it is believed that water softening by this method will be more effective.

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