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Armed Conflict Location & Event Data Project. URL: https://acleddata.com (дата звернення: 03.05.2023). **3.** CSP: Center for Systemic Peace. URL: https://www.systemicpeace. org/inscrdata.html (дата звернення: 03.05.2023). **4.** Global Report 2017: Conflict, Governance and State Fragility / M. G. Marshall, G. Elzinga-Marshall. Center for Systemic Peace, 2017. 52 p. URL: https://www.systemicpeace.org/vlibrary/GlobalReport2017.pdf (дата звернення: 03.05.2023). **5.** Lawrence M. J., Stemberger H. L. J., Zolderdo A. J., Struthers D. P., Cooke S. J. The effects of modern war and military activities on biodiversity and the environment. *Environmental Reviews.* 2015. №23(4). P. 443–460. DOI: 10.1139/er-2015-0039. **6.** Rawtani D., Gupta G., Khatri N., Rao P.K., Hussain C.M. Environmental damages due to war in Ukraine: a perspective. *Science of The Total Environment.* 2022. №850. 157932. DOI: 10.1016/j.scitotenv.2022.157932.

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METHODS OF PROCESSING LIQUID WASTE CONCENTRATES USING MATERIALS WITH CAPILLARY PROPERTIES

The volume of water on Earth is immeasurable, but the main part is salt water. a of the planet's river flow, which means that fresh water is enough to provide all industries. Nevertheless, the issue of

water scarcity is one of the most important problems of humanity today.

The socio-economic causes of the water deficit are results of the growing world's population, increase in living standards, changes in consumption patterns and increase in irrigated land. That is why water purification methods must meet today's problems, be affordable, effective and of high quality.

There are many factors that affect the quality of water resources, among them: the level of laboratory control, the quality of water supply pipes, the effectiveness of water protection measures, proper methods of water purification, and others. Water treatment and purification methods are currently quite effective, but they require improvement, development of new technologies and increased efficiency. [1]

The effectiveness of baromembrane water purification depends on the properties of the membranes, working pressure, temperature, nature and concentration of the substances to be purified impurities, concentration polarization, hydrodynamic conditions and design of the apparatus. At the same time, a large amount of concentrates is formed. When using ion exchange technologies, a large number of regenerative solutions are formed, which also require attention.

Another difficult task is the cleaning or processing of excessively wet suspensions of various substances. Membrane, thermal and hybrid methods are used for crystallization of concentrates.

Membrane methods have not become widespread in water treatment due to the complexity of the necessary equipment and significant energy costs

The thermal method has an even greater energy consumption, so it is often impractical. Promising direction is capillary filtration, it increases the productivity of directions in water treatment processes. The capillary effect in combination with other processes has become

widely used in various industries.For water desalination technologies, the processes of evaporation of liquids from porous capillary materials are very effective, they can also be used in solar energy production, in electronics, etc.Capillary effect can be used in many fields. Therefore, capillary filtration is a very promising direction for the development of water purification technologies. The combination of this effect with other technologies can be used in various industries. Aor example, in the production of solar energy, processes of evaporation of liquids from porous capillary materials are used.[2]

Certain methods of chemical analysis are based on the phenomenon of capillarity, many industrial and household equipment uses capillary tubes or materials. Also, the use of materials with capillary properties allows to create simple technologies for the treatment of water and various solutions without the consumption of electricity and additional chemical reagents.It has been shown that the use of filters made of such materials allows the efficient removal of various pollutants from aqueous solutions, as well as the separation of solid and liquid phases. [3]

However, at the same time, there are no technologies that would consider the use of the capillary effect as the main technological process in the concentrates crystallization. Therefore, research in this direction is quite promising. [4]

The aim of this work is to study materials with capillary properties as highly efficient evaporators.

To achieve the aim, the following tasks were set:

- evaluate the possibility of crystallization of substances from aqueous solutions using materials with capillary properties;

- to determine the conditions of crystallization of substances from concentrates of baromembrane water purification and effluents from ion exchange installations using materials with capillary properties.

1. I.M. Trus, M. D. Gomelya, Desalination of mineralized waters using reagent methods, Journal of Chemistry and Technologies, 29, 3, 2021, 417-424. URL: https://doi.org/10.15421/jchemtech.v29i3. 214939 (дата звернення 01.05.2023). **2.** M. Talaeipour, J. Nouri, A.H. Hassani, A. H. Mahvi 2017. An investigation of desalination by nanofiltration, reverse osmosis and integrated (hybrid NF/RO) membranes employed in brackish water treatment. *J Environ Health Sci Eng*. 15. 2017. 18. URL: https://doi.org/ 10.1186/s40201-017-0279-x (дата звернення 01.05.2023). **3.** M. Alberghini, S. V. Boriskina, P. Asinari, M. Fasano, Characterisation and modelling of water wicking and evaporation in capillary porous media for passive and energy-efficient applications. *Applied Thermal Engineering*. 208. 2022. 118159. URL: https://doi.org/10.1016/j.applthermaleng.2022. 118159 (дата звернення 01.05.2023). **4.** I. Trus, M. Gomelya, M. Skiba, V. Vorobyova, Preliminary studies on the promising method of ion exchange separation of anions. *Archives of Environmental Protection.* 47, 4, 2021, P. 93-97.

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