

USE OF SOLAR KINETIC ENERGY IN THE WATER DESALINATION PROCESS

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ABSTRACT:

The scarcity of water resources is a feature present in many places on the planet. In Brazil, and especially in Ceará, the crystalline characteristic of the soil generates a higher concentration of salts, which results in a higher degree of water salinity. In view of this, in order to alleviate the shortage of drinking water in these regions, it is proposed to create a hybrid desalination mechanism that provides a greater demand for fresh water that can meet local needs.

Keywords: Water; availability; salinity.

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UTILIZAÇÃO DA ENERGIA CINÉTICA SOLAR NO PROCESSO DE DESSALINIZAÇÃO DA ÁGUA

RESUMO:

A escassez de recursos hídricos é uma característica presente em diversos locais do planeta. No Brasil, e em especial, no Ceará, a característica cristalina que o solo possui gera uma maior concentração de sais, o que resulta em um grau de salinidade hídrica maior. Diante disso, no intuito de amenizar a carência de água potável nessas regiões, propõe-se a criação de um mecanismo de dessalinização híbrido que propicie uma maior demanda de água doce que possa suprir as necessidades locais.

Palavras-chave: Água; disponibilidade; salinidade.

INTRODUCTION

The surface of our planet is only 30% solid land. The remaining 70% is water, of which only 2.5% is fresh and, of these 2.5%, 1.0% is surface fresh water, 20% is groundwater and 79% is solid water. In this perspective, these values promote a reflection on the available water resources, as well as the current use.

Currently, desalination is considered a very viable alternative to alleviate the problems that the scarcity of water resources causes in some regions, even though it is not seen as a common means. This perspective is, however, in the process of change, as can be seen in the quote from WHO (2007), which highlights the approach of a new phase in the definition of the concept of water origin.

Desalination, therefore, consists of a form of water treatment, as this is a physical-chemical process that removes salts from the water, making it suitable for consumption.

The trend is that this mechanism is in the process of expansion, in order to generate great expectations for a promising future.

One of the alternatives for the desalination of water in arid and semi-arid environments is the thermal system that corresponds to the natural process of the water cycle, that is, the salinized (salty) fluid is heated, evaporated, condensed, which generates precipitation under the form of drinking water, that is, desalinated.

However, it is necessary to act on alternatives that enhance the process, making it faster and more efficient, since the natural water cycle is a slow and inefficient mechanism, taking into account the need to supply a family, for example. Thus, by creating means to obtain a hybrid and affordable desalinator, it will be possible to offer the poorest communities better conditions to obtain a satisfactory volume of water for their survival.

MAIN GOAL

Develop a thermal desalinator accessible to the poorest communities, and that is also capable of obtaining a satisfactory volume of water.

Specific objectives

- Conduct a bibliographic research related to the types of desalination;
- Build a hybrid heating mechanism that uses electric and solar energy;
- Carry out comparative water desalination tests;
- Classify the water quality and the volume made available by the equipment;
- Measure the energy expenditure of the process and its economic viability.

METHODOLOGY

Literature searches were carried out related to the types of desalination, their advantages and disadvantages. From the information gathered, materials necessary for the development of a hybrid thermal desalinator model were collected. Water quality tests were carried out, related to its initial salinity, and soon after, it was desalted using the built-in desalination plant. The desalinated water was analyzed and compared with the previous result of the tested water. Measurements were made of the volume of desalinated water and the time for desalination. Then, an economic feasibility analysis of the system was performed.

RELEVANCE OF THE PROJECT

The project will provide many communities, which have inadequate local water supplies, with more affordable desalination, freeing them from dependence on external water sources. Making families self-sustainable in terms of water availability.

PROJECT/RESEARCH IMPACT

The project will provide drinking water for the most vulnerable families in terms of water availability, especially those living in arid and semi-arid regions. Due to the production cost of the equipment, which practically only needs solar energy to carry out the desalination process, it becomes accessible to several rural communities.

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SEARCH RESULTS

natural desalinator

An experiment was carried out using a PET bottle, a small transparent hose and a support to measure the amount of water, in order to create a natural desalinator. The process consisted of putting saline water in the bottle and placing it exposed to sunlight. After one day, it was possible to observe that only 4 milliliters of water had precipitated during desalination. The schematic is shown in figure 1 and 2.

Figure 1: Natural desalinator experiment.



Figura 2: Experimento do dessalinizador natural.



Disregarding some droplets that were lost through the hose, we can consider the following hypothesis: if 1000 similar bottles were used, under these same conditions, the amount of water that would be obtained at the end of 30 days would be equivalent to 120 liters. Taking into account that on average a person weighing 80 kg should consume 2.8 liters of water per day, these thousand little bottles would be able to supply this person's consumption for about 42 days.

FINAL CONSIDERATIONS

As it was possible to observe, the natural process of water requires a longer time to happen and to be able to supply the lack of water resources in arid and semi-arid places. Therefore, there is a need to enhance the process, using electrical energy, in addition to sunlight itself.

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