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Process of desalination of low energy consumption. Energy + magnetohydrodynamics (E + MHD) desalination process

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ABSTRACT

This paper shows the theoretical justification of a new process of desalination which involves the use of electrodialysis concepts regarding the use of charged- ion selective membranes to create differentiated cells of concentrated salt water and diluted or desalinated water. However, the concept of transporting ions changes in this case with respect to electrodialysis, since in order to transform the ions, the second term of the Lorentz equation is used instead of the first term. In the first term, there is an electric field, which is used by conventional electrodialysis, whereas in the second term there is the joint action of a magnetic field together with the velocity of the fluid to cause the motion of electric charges according to their signs. The use of a magnetic field instead of the use of an electric field can be an advantage when trying to solve the electro-neutrality of the cells of the edges without having to turn to the use of redox reactions. The expected energy saving is more than 75% in the case of electrodialysis energy consumption and more than 45% in the case of reverse osmosis energy consumption. This process of desalination works from two main parameters: 1) One permanent magnetic dipole. Therefore the energy of this magnetic field remains inalterable throughout the time; 2) The electric charge speed on the desalted water vs. the magnetic field of the magnetic dipole. This speed does not have to be high.

Keywords: Desalination; Magnetic, field, Electrodynamics; Ion exchange membrane, Energy, Magnetohydrodynamics; Reverse osmosis

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