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New approach to the utilisation of concentrates obtained during geothermal water desalination

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ABSTRACT

The paper presents the results of research on the efficient use of concentrates obtained during the desalination of different types of geothermal water using membrane processes. The analysis is based on results for 18 concentrates which included macroelements and certain therapeutic ingredients, potentially toxic elements (heavy metals) and radioactive elements. The research demonstrated that concentrations of potentially toxic metals in most concentrates do not exceed the limits recognised as safe for human health, irrespective of the manner in which the human body comes into contact with them. These concentrates can be used: (1) for inhalation and rinsing the nose and mouth for the purpose of loosening and removing mucus and relieving inflammation; (2) for cosmetic purposes in the form of cleansing and moisturising liquids; (3) for bathing, both individual and in recreational or therapeutic pools. The second innovative approach is related to harvesting energy from the salinity gradient. The purpose is to purify geothermal water while also extracting the energy generated by mixing effluents with different salinity levels. The RO process results in the discharge of concentrated brine which can be considered a source of salinity gradient energy. In this respect, two methods are considered: reverse electrodialysis and capacitive mixing.

Keywords: Concentrate; Membrane processes; Human health; Salinity gradient; Energy

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