

## Theoretical study of various configurations of solar desalination by vacuum membrane distillation

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### ABSTRACT

Vacuum membrane distillation is a thermal desalination process characterized by a low operating temperature which gives the possibility to coupling with renewable energy. New systems for producing drinking water from seawater using vacuum membrane distillation coupling with solar energy were simulated. The study of different configurations has allowed us to present the processing advantages and disadvantages of each configuration, and enabled us to suggest recommendations on the choice of the configuration according to the type of membrane and application context. In this work, two types of coupling configuration for the type of collectors were investigated. The models concerning the hollow fiber module, the cylindro-parabolic solar collector (CPC) and salinity gradient solar pond (SGSP) were developed. The simulation of the module model allows for the study of the effect of various parameters such as the temperature, velocity and salinity. Then the coupling between this model and the solar collector model was achieved. The solving of models equation allows the determination of each coupling configuration production along the year. The simulation shows that the production of the integrated module in a solar pond is the most productive configuration confirming the interest of the module integration. This system allows the production to reach about 32.5 m<sup>3</sup>/y.

*Keywords:* Solar energy; Desalination; Membrane distillation; Integrated system

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