

Solar Energy Applications in Seawater Distillation

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Abstract : Geographically, the most Arabic countries locate in areas confined to arid or semiarid regions. For this reason, most of our countries have adopted the seawater desalination as a strategy to overcome this problem. For example, the water supply of AUE, Kuwait, and Saudi Arabia is almost 100% from the seawater desalination plants. Many areas in Saudia Arabia and other countries in the world suffer from lack of fresh water which hinders the development of these areas, despite the availability of saline water and high solar radiation intensity. Furthermore, most developing countries do not have sufficient meteorological data to evaluate if the solar radiation is enough to meet the solar desalination. A mathematical model was developed to simulate and predict the thermal behavior of the solar still which used direct solar energy for distillation of seawater. Measurement data were measured in the Environment and Natural Resources Department, Faculty of Agricultural and Food sciences, King Faisal University, Saudi Arabia, in order to evaluate the present model. The simulation results obtained from this model were compared with the measured data. The main results of this research showed that there are slight differences between the measured and predicted values of the elements studied, which is resultant from the change of some factors considered constants in the model such as the sky clearance, wind velocity and the salt concentration in the water in the basin of the solar still. It can be concluded that the present model can be used to estimate the average total solar radiation and the thermal behavior of the solar still in any area with consideration to the geographical location.

Keywords : mathematical model, sea water, distillation, solar radiation

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