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Experiment and optimal parameters of a solar heating system study on an absorption solar desalination unit

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ABSTRACT

Based on the mechanism of falling film evaporation and condensation, a quadruple effect regeneration absorption solar desalination unit was designed and tested indoors under transient and steady-state conditions. The performance ratio and the flow rate of freshwater of the unit at different operating temperature and pressure were studied. Through the test, it is shown that the performance ratio of the unit is high because most of latent heat of vapors and part of sensible heat of brine are utilized many times. Meantime, lithium bromide can automatically absorb the vapors of the last stage evaporator so as to recover vapor enthalpy and intensify the process of evaporation. The PR of the unit is more than 3.0, which illustrates the advantages of the absorption desalination system. The other factors influencing the flow rate of freshwater were also researched. From the indoor experimental results, the solar heating system of the unit was studied by simulation under the conditions of the least cost of fresh water. The optimal parameters, which are solar collector areas, storage volume, start-up and break temperatures, are given.

Keywords: Solar desalination; Falling evaporation; Absorption

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