



Computational thermal analysis of a double slope solar still using Energy2D

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ABSTRACT

A theoretical evaluation of a double slope solar still using the Energy2D computer program is presented in this document. The heat absorbing plate is 0.25 m² square, 5 cm high and constructed of stainless steel. The water film is 3 cm high. Conduction heat losses of three commercial thermal insulation were studied: (i) polyurethane (PU), (ii) glass wool (GW), and (iii) expanded polystyrene (EPS). The insulation thickness is 15 cm and the glass cover is tilted at an angle of 30°. For the simulation, thermal conductivity, specific heat, mass density, and optical properties such as emittance, absorptance, reflectance, and transmittance coefficients were considered. After five hours of simulation, the left, central and right zones of insulator indicates 29.7°C; 45.2°C; 25.2°C, while the left, central and right zones indicates 75.7°C; 75.0°C; 75.5°C. The heat flux insulator, water and glass cover in its central zones are: 16.4, 301 and 72.9 W.m⁻², correspondingly. The lower heat loss was observed when PU is used as thermal insulation, while the greater loss when EPS is used. The three materials PU, EPS, and GW registered a temperature of 45°C, at a simulation time of 3 h, 1.5 h, and 45 min, respectively.

Keywords: Solar still; Solar desalination; Eco-technology; Heat transfer; Energy2D

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