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Paper Information

Experimental investigation on the effect of PCM and nano-enhanced PCM of integrated solar collector performance

Author(s): C. L. Saw, H. H. Al-Kayiem & A. L. Owolabi

Abstract:

The availability of hot water is essential for overnight industrial and domestic use.

Integrating the solar heater with thermal energy storage showed a promising result on hot water production when sunlight is not present.

In the present work, an outdoor experimental investigation of a flat plate solar collector was carried out with PCM and nano-enhanced PCM.

The phase change material (PCM) used in this experiment is paraffin wax.

However, 1% weight fraction of 20nm copper nanoparticles was added to improve the properties of the compound.

Three cases have been investigated, namely, without PCM, with PCM and with nanoenhanced PCM (nano-PCM).

It was found that at the operational mode of 0.5 kg/min and at a 10° inclination angle, with PCM and nano-PCM, hot water at 40.2°C and 40.8°C was produced the following morning.

However, without the PCM case hot water was produced at 35.2°C.

The system was enhanced by 6.9% and 8.4% respectively when PCM and nano-PCM were used.

Keywords:

PCM, solar, nano-enhanced PCM, TES, integrated, nanoparticles...

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